DOCUMENT RESUME

ED 022 594 RC 002 600

OUTDOOR RECREATION RESEARCH, A REFERENCE CATALOG - 1967. NUMBER 2.

Department of the Interior, Washington, D.C. Bureau of Outdoor Recreation.; Smithsonian Institution, Washington, D.C. Science Information Exchange.

Report No-ORR-2

Pub Date Mar 68

Note-182p.

EDRS Price MF-$0.75 HC-$7.36

Descriptors-ABSTRACTS, *CATALOGS, *INDEXES (LOCATERS), INFORMATION DISSEMINATION, *OUTDOOR EDUCATION, *RECREATION, REFERENCE MATERIALS, *RESEARCH

Ongoing research in outdoor recreation during 1967 is identified through brief abstracts of research projects, lists of organizations and principal investigators conducting the research, and a subject index. The four major research areas constituting chapter headings are resources, user studies, economics, and research methods. Related document RC 002 597 provides a similar catalog of information for 1966. Other related documents are RC 002 598 and RC 002 599. (VM)

Outdoor Recreation Research

A Reference Catalog • 1967

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DEPARTMENT OF THE INTERIOR Bureau of Outdoor Recreation

OUTDOOR RECREATION RESEARCH

A REFERENCE CATALOG • 1967

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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Number 2

Published March 1968

DEPARTMENT OF THE INTERIOR
Bureau of Outdoor Recreation
and
Smithsonian Institution
Science Information Exchange

CONTENTS

Foreword V

Sample Notice of Research Project VII

Guidelines for completing Notice of Research Project IX

I. Descriptions of Individual Efforts

Chapters — Page

1. Resources 1
2. User Studies 61
3. Economics 93
4. Research Methods 115

II. Performing Organizations 125

III. Principal Investigators 127

IV. Subject Index 129

FOREWORD

This is the second catalog prepared by the Science Information Exchange of the Smithsonian Institution as a service developed by the Bureau of Outdoor Recreation, Department of the Interior, in cooperation with other Federal agencies, State organizations, universities, and research contractors. It is based on project outlines submitted by outdoor recreation research workers throughout America.

The purpose of this compilation is to present in one reference volume a listing and brief description of current and recently completed outdoor recreation and quality of the environment research projects to allow research personnel to maintain current awareness of contemporary activities of other investigators. By this means, it should be possible to reduce duplication of effort and facilitate a free exchange of opinions and research findings among scientists and organizations.

This catalog is not a bibliography. *Its basic purpose is to identify ongoing research in outdoor recreation.* Users should *not* expect that publications or reports on any given project are immediately available. Projects reported may not be completed for several years. In some instances, a project may even be dropped and not completed. We will appreciate your cooperation in refraining from making blanket requests of investigators for reports while research is still in progress.

To qualify for inclusion, project outlines had to be directly related to outdoor recreation or environmental quality. Certain fish and wildlife research projects were included because of the involvement of users. Thus, hunter preference research, hunter and fisherman success research, and research on the recreation utilization of fish and wildlife resources were included. More general biological research was not included. Suggestions are invited as to the kinds of coverage and types of research projects to include in future catalogs.

In addition to utilizing the outlines of active projects previously submitted, an effort was made to contact consultants and other private research workers in order to invite their submissions. Despite publicity given the invitation to submit project outlines, it is probable that some eligible projects may not have been included.

This second collection of outdoor recreation research summaries should serve to stimulate greater future cooperation. No date has been set for the next compilation, but potential contributors are urged to keep their submittals current with the Science Information Exchange. A blank Notice of Research Project Form with instructions is enclosed. Completed forms should be forwarded to the Science Information Exchange for registration. Additional forms may be obtained by a written request, or simply reproducing the one enclosed.

Lawrence N. Stevens

Lawrence N. Stevens
Associate Director

October 6, 1967

SI-SIE-78A; REV. 6-64

NOTICE OF RESEARCH PROJECT
SCIENCE INFORMATION EXCHANGE
SMITHSONIAN INSTITUTION

NOT FOR PUBLICATION OR PUBLICATION REFERENCE

SIE NO.	
AGENCY NO.	

SUPPORTING AGENCY:

TITLE OF PROJECT:

Give names, departments, and official titles of PRINCIPAL INVESTIGATORS and ALL OTHER PROFESSIONAL PERSONNEL engaged on the project.

NAME AND ADDRESS OF INSTITUTION:

SUMMARY OF PROPOSED WORK – (200 words or less.) – In the Science Information Exchange summaries of work in progress are exchanged with government and private agencies supporting research, and are forwarded to investigators who request such information. Your summary is to be used for these purposes.

SIGNATURE OF PRINCIPAL INVESTIGATOR ______

PROFESSIONAL SCHOOL (medical, graduate, etc.) ______

SI-SIE-78
6-64

GUIDELINES FOR COMPLETING FORM ARE GIVEN IN THE DOTTED BLOCKS

NOTICE OF RESEARCH PROJECT
SCIENCE INFORMATION EXCHANGE
SMITHSONIAN INSTITUTION

NOT FOR PUBLICATION OR
PUBLICATION REFERENCE

SIE NO.

AGENCY NO.

SUPPORTING AGENCY:

NAME OF THE SUPPORTING AGENCY
NAME OF THE SUPPORTING BUREAU OR OFFICE, IF KNOWN
IF MULTIPLY FUNDED, NAME OF CO-SPONSOR(S)

UNIQUE IDENTIFICATION NUMBER
(TASK # OR SYMBOL)

TITLE OF PROJECT:

TITLE SHOULD BE AS SPECIFIC AS POSSIBLE

Give names, departments, and official titles of PRINCIPAL INVESTIGATORS and ALL OTHER PROFESSIONAL PERSONNEL engaged on the project.

1. INDICATE WHO IS THE PRINCIPAL INVESTIGATOR IF MORE THAN ONE NAME APPEARS.
2. IF INVESTIGATORS ARE ASSOCIATED WITH UNIVERSITIES, INCLUDE THEIR SCHOOL AND DEPARTMENT AFFILIATIONS. FOR OTHER TYPES OF ORGANIZATIONS, INCLUDE CORRESPONDING DIVISIONAL AND UNIT DESIGNATIONS.

NAME AND ADDRESS OF INSTITUTION:

TO WHICH THE TASK WAS AWARDED

SUMMARY OF PROPOSED WORK – (200 words or less.) – In the Science Information Exchange summaries of work in progress are exchanged with government and private agencies supporting research, and are forwarded to investigators who request such information. Your summary is to be used for these purposes.

THE SUMMARY IS USED AS A MEANS OF COMMUNICATION AND IS PREFERABLY WRITTEN BY A SCIENTIST OR ENGINEER WHO IS FAMILIAR AND CLOSELY ASSOCIATED WITH THE RESEARCH TASK. THIS SUMMARY SHOULD NOT CONTAIN INFORMATION THAT CANNOT BE GIVEN OTHER RESEARCH SCIENTISTS AND ENGINEERS. IT PROVIDES INFORMATION ON RESEARCH WORK NOT YET PUBLISHED AND NOT OTHERWISE AVAILABLE. THE SUMMARY SHOULD DESCRIBE THE PROBLEM CLEARLY, SHOW RELATIONSHIPS TO OTHER ASPECTS OR TO BROADER AREAS OF RESEARCH, AND SHOULD IDENTIFY PLAN OF PROCEDURE, TECHNIQUES, INSTRUMENTS AND SPECIAL MATERIALS, ORGANISMS OR OTHER BIOLOGICAL PREPARATIONS USED, SPECIAL ENVIRONMENTS, ETC. EACH RECORD SHOULD SUMMARIZE A SINGLE RESEARCH TASK OR A SMALL DISCRETE UNIT OF RESEARCH SO THAT IT MAY BE ANALYZED AND INDEXED IN TECHNICAL DEPTH AND DETAIL FOR EFFECTIVE USE.

IF WORK IS BEING PERFORMED ELSEWHERE THAN AT LOCATION OF RECIPIENT'S INSTITUTE, INDICATE WHERE

THE LAST SENTENCE OF THE PROJECT DESCRIPTION SHOULD STATE THE FISCAL YEAR IN WHICH THE PROJECT WAS STARTED AND THE FISCAL YEAR IN WHICH IT IS ANTICIPATED THAT IT WILL BE COMPLETED.

CURRENCY OF REPORTING –
THIS FORM SHOULD BE:
(1) SUBMITTED AT THE START OF EACH NEW PROJECT
(2) REVIEWED AND REVISED ANNUALLY THEREAFTER, OR
(3) WHENEVER DURING THE COURSE OF A FISCAL YEAR A PROJECT IS SUBSTANTIALLY CHANGED.

PLEASE DO NOT REGISTER A RESEARCH PROJECT SUPPORTED BY A FEDERAL AGENCY, FOUNDATION, OR FUND RAISING AGENCY, IF YOU HAVE ALREADY REGISTERED SUCH A PROGRAM AT SIE DURING THE CURRENT FISCAL YEAR.

SIGNATURE OF
PRINCIPAL INVESTIGATOR ____________________

PROFESSIONAL SCHOOL
(medical, graduate, etc.) ____________________

(A) DATES OF CURRENT PROJECT AUTHORIZATION (FISCAL YEAR, OR MONTH/YEAR TO MONTH/YEAR)
(B) ANNUAL LEVEL OF EFFORT IN DOLLARS, IF SPECIFIED
(C) IF MULTIPLY FUNDED, THE ANNUAL DOLLAR SUPPORT BY EACH SPONSOR

NOTE: FUNDING INFORMATION IS NOT RELEASED EXCEPT WITH APPROVAL OF SUPPORTING AGENCY, OR TO AUTHORIZED REVIEWING BODIES.

I. DESCRIPTIONS OF INDIVIDUAL EFFORTS

1. RESOURCES

1.1

Eastaboga Fish Hatchery
Eastaboga, Alabama

A BIOLOGICAL INVENTORY OF THE STREAMS AND IMPOUNDMENTS OF THOSE PORTIONS OF THE WARRIOR RIVER BASIN, COOSA RIVER BASIN, TALLAPOOSA RIVER BASIN, CHATTAHOOCHIE RIVER BASIN, AND CAHABA RIVER BASIN WITHIN 12 EAST-CENTRAL ALABAMA COUNTIES

H. D. Kelly
Supported by *Alabama Department of Conservation*

The purpose of this study is to collect biological data from the streams and impoundments as related to the fishery of these river basins as follows:

- I. Fish
  - a. Species
  - b. Species distribution
  - c. Food habits
  - d. Spawning data
  - e. Stream production (as indicated by population samples)
  - f. Impoundment production (as indicated by population samples)
- II. Fish food organisms
- III. Aquatic plants
- IV. Sport fishery utilization
- V. Commercial fishery
- VI. Effects of pollution

Recent studies have indicated the pressures of an increased demand upon our waters by fisherman and others who use our waters in the years to come. It is felt that this information will better equip us to meet this challenge.

1.2

Alaska Department of Fish and Game
Subport Building
Juneau, Alaska

INVENTORY AND CATALOGING OF THE SPORT FISH AND SPORT FISH WATERS IN THE INTERIOR OF ALASKA

Eugene Roguski
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Job Description:

1. To assess the environmental characteristics and fish species composition of the fishery waters of the job area and, where practicable, obtain estimates of existing or potential angler use and sport fish harvest.
2. To investigate remote area waters; determine fish species composition, quality of angling, accessibility, and value in distributing angler effort over a wider area, to offer desired protection of individual fish stocks.
3. To evaluate present stocking policies and programs and assess fish survival, growth, and interspecies relationships.
4. To evaluate application of fishery restoration measures and availability of sport fish egg sources.
5. To evaluate the success of adult, fry and eyed egg lake trout transplants in establishing a fishery for this species in Harding Lake.
6. To determine the suitability of lakes of various water quality and ecological characteristics for introduction of arctic grayling and to expand the number of waters in which this species may provide a sport fishery.
7. To assist as required in the investigations of public access status to the area's fishing waters.
8. To evaluate multiple water use development projects (public and private) and their effects on the area's streams and lakes.

1.3

Alaska Department of Fish and Game
Juneau, Alaska

INVENTORY AND CATALOGING OF THE SPORT FISH AND SPORT FISH WATERS IN INTERIOR ALASKA

Larry Heckart
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

To assess and inventory the physical, chemical, and biological characteristics of the existing and potential fishery waters of Interior Alaska, with emphasis on the Fairbanks area.

To obtain estimates of angler use and sport fish harvest, and to investigate public access to fishing waters.

To evaluate application of fishery restoration measures and availability of sport fish egg sources and to evaluate present stocking policies.

To evaluate multiple water use, development projects (public and private) and their effects on the area's sport fish resources. To investigate remote areas of water as potential fly-in fisheries.

Procedures:

Lakes and streams and coastal areas will be studied and records maintained to provide adequate guidelines in directing comprehensive management programs in the area.

Waters presently unsatisfactory will be rehabilitated, restocked with hatchery transplanted native trout, char, salmon and grayling.

Waters within and adjacent to the following areas will be initially surveyed: the Nome Highway system, the Taylor Highway, the New Fairbanks-Anchorage Highway presently under construction and waters of the Tangle Lake system.

To evaluate the existing stocking program, Jan, Lisa, Craig, Donna, Little Donna, 81 Mile, Mark, and Bolio Lakes will be test netted for population analysis.

When possible, trout, char, grayling and salmon egg sources will be investigated and if feasible, egg takes will be conducted.

1.4.

University of Alaska
College, Alaska

FACTORS AFFECTING THE DEVELOPMENT OF THE WATER RECREATION POTENTIAL OF THE LAKES AND RIVERS OF THE BRISTOL BAY REGION OF ALASKA

Frank W. Kearns

Supported by *Office of Water Resources Research, U.S.D.I.*

The rivers and large lake system draining into Bristol Bay in Southwestern Alaska constitute one of the most valuable salmon fisheries in the State. In addition the waters offer excellent sport fishing.

This project would provide for a preliminary analysis of the factors which affect directly the fulfilling of the recreation potential of this area. Data on such items as (1) present and projected population of the area; (2) user statistics; (3) conflicts between recreational and commercial fishing in the area; (4) transportation needs and access routes; and (5) State and Federal land use policies will be compiled and analyzed.

1.5

Arizona Game and Fish Department
Phoenix, Arizona

COOPERATIVE WATER RESOURCES INVENTORY OF ARIZONA

Robert E. Curtis

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The purpose of this investigation is to determine the present water resources in Arizona, to determine the present and future water requirements of hunting and fishing use in Arizona, to determine the economic implications of hunting and fishing use, and to locate potential water impoundment sites to satisfy future hunting and fishing requirements.

An inventory of available water resources in Arizona will be continued in cooperation with the Bureau of Reclamation and the Branch of River Basin Studies of the Fish and Wildlife Service. Estimates of hunting and fishing water requirements will be determined by reference to creel census data, hunting pressure estimates, and predicted populations to be obtained from any available source. Economic values of hunting and fishing use will be determined by reference to Senate Document No. 97, Supplement No. 1, entitled, *Evaluation Standards for Primary Outdoor Recreation Benefits*, existing publications, and other sources as they become available. During this segment, a lake site analyst will investigate as many lake sites as possible to coordinate and correlate preliminary biological and engineering data. Biological and engineering studies of proposed impoundment sites will be accomplished by qualified personnel as time permits.

1.6

Arizona Game & Fish Department
Phoenix, Arizona

WATER STORAGE PROJECT-CENTRAL ARIZONA PROJECT

Robert D. Curtis

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

To investigate in all respects relating to fish, wildlife, and recreational resources proposed diversionary routes, associated dams, reservoirs, and aqueducts which have been proposed to transfer Colorado River water to Central Arizona. Recommendations will be designed and formulated to promote conditions to improve these resources.

Aerial and ground reconnaissance studies and photographs of type localities along the proposed route will be taken for ready reference. Basic data, including creel census and road check interviews for fishing, hunting, and related recreational use, will be gathered and compiled for presentation in a proposed management plan to be written in the future. Fishermen and related recreational users will be contacted by River Basin aides hired specifically to obtain information through periodic road checks and spot checks in the field in order to obtain data on sportsmen pressure in several predetermined areas in the State.

Location of Work: Statewide along the Colorado River, the proposed Granite Reef Aqueduct, and select lakes.

1.7

Arizona Game and Fish Department
Phoenix, Arizona

EVALUATION OF TROUT STOCKING PROGRAM IN THE LAKE MOHAVE AREA

James R. Bruce

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective:

Investigational studies will be continued or initiated to evolve management policy in localized areas requiring a more intensive study than is necessary under inventory jobs.

Segment Objective:

To determine fishing quality and to evaluate the trout planting programs.

Procedures:

Creel census information will be gathered one weekend day and one weekday per week at Willow Beach. Creel census information will be gathered during all weekend days at Katherine Wash. Plants of trout will be marked and the return to the creel of stocked fish will be estimated from information gathered at Willow Beach and Katherine Wash.

Information collected during angler interview will include:

1. Species and length of fish harvested.
2. Origin of fishermen.
3. Hours fished and total fish taken.
4. Method of fishing.
5. Incidence of marked fish in the creel.

1.8

Arizona Game and Fish Department
Phoenix, Arizona

CENTRAL ARIZONA PROJECT

Roland C. Kufeld

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To determine the fish and wildlife aspects related to structures and developments proposed for construction as part of the Central Arizona Project, and to formulate recommendations directed toward inclusion of maximum fish and wildlife benefits in Central Arizona Project Planning.

Procedures: Maps, reports, correspondence, and pertinent engineering data for all project routes have been obtained from agencies involved. Field studies will be continued to obtain information of existing fish, wildlife, and related recreational resources in the areas that will be affected by proposed construction. In the event that Congressional approval is favorable to the Central Arizona Project during this segment, our field studies will be intensified by an accelerated program to keep abreast of the project. Particular attention will be focused on the Bureau of Reclamation's proposed route to divert water to Central Arizona by way of Granite Reef Aqueduct and the possible implications with regard to fish, wildlife, and related recreational resources.

Aerial and ground reconnaissance studies and photographs of type localities along the proposed route will continue for ready reference, including photographs, where needed, for illustrative purposes in the completion reports.

Basic data, including creel census and road check interviews for fishing, hunting, and related recreational use, will be gathered and compiled for presentation in a proposed management plan to be written in future segments of this project.

1.9

Arizona Game and Fish Department
Phoenix, Arizona

ALAMO DAM

Roland C. Kufeld

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective:

To determine the possible effects of Alamo Dam on fish and wildlife resources, and to make recommendations directed toward obtaining maximum fish and wildlife benefits in the area affected by construction of the dam.

Procedures:

Various reports and correspondence regarding dam construction and recreational aspects will be reviewed to keep current on project activities. Studies will continue as needed to yield supporting data in determining economic loss and/or benefit to wildlife resources.

Assistance will be given to the Department's Game and

Fish Management Divisions in formulating management plans for the area. These management plans will be coordinated with the Army Corps of Engineers, and with other agencies involved with the project.

1.10

Arizona Game and Fish Department
Phoenix, Arizona

COOPERATIVE LAND AND WATER RESOURCES INVENTORY

Roland C. Kufeld

Supported by *Bureau of Sports Fisheries and Wildlife, U.S.D.I.*

Objectives:

To determine the present and future uses and needs of hunting and fishing in Arizona with regard to present and future land and water resources, and to formulate management recommendations designed to meet these needs.

Procedures:

An inventory of available water resources in Arizona will be continued in cooperation with the Bureau of Reclamation and the Branch of River Basin Studies, Bureau of Sport Fisheries and Wildlife.

Visitation surveys will be conducted on representative land and water areas to determine the extent and value of hunting and fishing. Use estimates derived from these surveys will provide a basis for determining additional hunting and fishing requirements, and for estimating expected hunting and fishing use on areas developed for fish and wildlife in the future.

Fishermen and related recreational users will be contacted in the field through periodic road checks in order to obtain data on sportsmen pressure in several predetermined areas in the State. Eight lakes will be visited periodically on predetermined days for a designated length of time to obtain visitation information and fishing results. The lakes at which surveys will be conducted during this segment are Parker Canyon, Pena Blanca, Riggs Flat, Bartlett, Black Canyon, Lyman and Lee Valley. Surveys will also be made at Lynx Lake if construction of the road leading into the area is completed during this segment.

Biological and recreational use investigations will be made in prospective areas being considered for acquisition or cooperative management under provisions of the Land and Water Projects Recreation Act, Classification and Multiple Use Act, Fish and Wildlife Coordination Act, and other legislation under which lands can be made available to the Arizona Game and Fish Department for fish and wildlife management purposes. Results of these investigations will be used to determine if the fish and wildlife potential of these areas is of significant enough value to justify expending funds to acquire or gain control of them for purposes of intensive development or management.

Assistance will be given in planning management programs for land and water areas acquired or placed under control of the Arizona Game and Fish Department. Game and fish management programs will be coordinated among the various divisions of the department and with other cooperating agencies.

1.11

Arizona Outdoor Recreation Coordinating Commission
Phoenix, Arizona

ARIZONA OUTDOOR RECREATION PLANNING PROJECT

David A. Roe, Jr.

Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This project will result in negotiating a contract with a consultant to update the initial plan and complete a final published comprehensive outdoor recreation plan. Emphasis will be on site evaluation and an action program with consideration of other basic planning requirements which need additional supporting data not included in the preliminary plan. Also this project will include management, technical, and cooperative services to maintain the preliminary plan and related functional expenses to conduct the project.

Major elements of this project are summarized as follows:

1. The amount, demand and kinds of outdoor recreation opportunities.
2. Use levels of facilities without detrimental overuse.
3. Present and future role and supply of private enterprise.
4. Existing and future recreation needs by activity.
5. Special studies including scenic highways, trails, unusual interests, wild rivers, urban beautification, and a policy criteria for outdoor recreation.
6. A detailed action program to coordinate all planning efforts with balanced results.

1.12

University of Arizona
Tucson, Arizona

TRENDS IN URBANIZATION, INDUSTRIALIZATION, AND RECREATIONAL USE OF ARID LANDS

Andrew W. Wilson

Supported by *University of Arizona*

The paper will attempt to summarize what is happening in three areas:

1. The population trends and growth rates of cities of more than 50,000 population located in the very arid (according to Meigs) areas of the earth.
2. The trends and rate of growth in manufacturing employment in the cities specified in part 1 above.
3. The increases in tourism, if any, that may be taking place in the areas of very arid and arid climate.

1.13

Barton-Aschman Associates
Chicago, Illinois

MULTIPLE USES OF LANDS WITHIN HIGHWAY RIGHTS-OF-WAY

Supported by *U. S. Bureau of Public Roads and American Association of State Highway Officials*

Urban and rural areas include land which was necessarily acquired to provide space for the present and future safe design and operation of highways but which is not now used. A literature survey is being made of such land as areas within median strips, at interchanges, under elevated structures or bridges, and alongside roadways, all within functional rights-of-way. Information is being collected on what has been and what might be accomplished with surface use of these plots of land, within the rights-of-way of fully controlled access highways, in the interests of both the highway user and the community through which the highway passes. An evaluation is to be made of the assembled examples in terms of (1) safety, (2) traffic operations, (3) the interests of the highway user, (4) the interests of the community, and (5) aesthetics and other considerations. Policies and legal requirements which have been established relative to use of these lands will be summarized.

1.14

Barton-Aschman Associates
Chicago, Illinois

MULTIPLE USES OF LANDS WITHIN HIGHWAY RIGHTS-OF-WAY

H. R. Joymer

Supported by *American Association of Highway Officials and U. S. Bureau of Public Roads*

A literature review is to be made and examples assembled of what has been accomplished on the multiple uses of lands within highway rights-of-way in various States and foreign countries. The examples are to be evaluated in terms of safety traffic, operations, interests of the highway user, interest of the community, and aesthetic and economic factors. Relevant policies and legal requirements will be summarized and recommendations made for the use of land within highway rights-of-way.

1.15

E. H. Bourquard and Associates
Harrisburg, Pennsylvania

WATER RESOURCES STUDY OF BRANDYWINE CREEK BASIN IN PENNSYLVANIA

C. H. McConnell

Supported by *Commonwealth of Pennsylvania*

Investigate the present water requirements of all municipalities in the study area; through population studies predict future water requirements and analyze the water supply potential of major streams in the Basin; conduct investigations of reservoir and dam sites in the area upstream from the population centers of Coatesville and Downingtown to determine the most economical storage; and, through the preparation of preliminary plans and cost estimates for each selected reservoir site, develop a comprehensive water resources plan including water supply, flood control, flow augmentation and recreation.

1.16

The Resources Agency of California
Department of Fish and Game
Terminal Island, California

ANALYSIS AND EVALUATION OF SPORT FISHING ACTIVITIES IN SOUTHERN CALIFORNIA

Leo Pinkas

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: Compile and analyze the data gathered by our creel census of private vessels in 1964; and the shoreline from April 1, 1965 through March 31, 1966. Write a report, for publication, describing the creel census work and the results of our data analysis.

Procedures: The compilation of the data is a carryover of work initiated during the fiscal period 1965-1966 (Jobs 1 and 2 of F-20-R-4). We estimate that about half of the field data will require processing at the beginning of this work period. We will compute estimates of total effort, total catch, species composition, and catch-per-unit-of-effort from the monthly data summaries, as well as from the yearly summations. The results of our studies will be compared with other sport fishing activities, i.e., party boats, in California and elsewhere.

Location of Work: California State Fisheries Laboratory, Terminal Island.

1.17

California Department of Fish and Game
Sacramento, California

UPLAND GAME INVESTIGATIONS-LICENSED PHEASANT CLUB MANAGEMENT PROGRAM

Harold T. Harper

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

To determine the role of licensed pheasant clubs in the overall pheasant management program in order to formulate future management plans for these clubs.

Procedure:

A review of the licensed pheasant club program will be made to determine the effect on these clubs of the growth of the program, law and regulation changes, number of hunters accommodated, release of game farm birds, and the take of wild birds, on these clubs. The overall effect of licensed pheasant clubs on the resource will be determined by the results of mortality and population turnover studies, game farm pheasant returns vs. wild bird returns. Such results will be obtained from band returns and from field studies of the habitat conditions on these clubs as compared to other club and non-club areas. The need for law and regulation changes will be determined for future management practices.

1.18

University of California
Berkeley, California

THE IMPACT OF WATER EXPORT ON THE AREA OF ORIGIN: A STUDY OF THE OWENS AND MONO BASINS OF EASTERN CALIFORNIA

James J. Parsons

Supported by *Office of Water Resources Research, U.S.D.I.*

This proposal is for a study of the consequences of water export upon human utilization of the Owens and Mono Basins. From these two adjacent basins of internal drainage a sufficient amount of water since 1913 has been transferred 250 miles south to the City of Los Angeles to alter significantly what had been a slowly growing agricultural economy based on irrigation. This export of water, vital to the rapid growth of Los Angeles, has thus far been an effective barrier to growth in the area of origin where the chief utilization in a region of prime scenic attraction is now recreation, which may expand considerably in the near future. The project has four chief objectives: to determine how water export has affected the utilization of this area from 1913 to the present, to estimate what utilization might have occurred without water export, to predict future utilization with continued export or its possible cessation, and to discuss relationships and applications of the Owens-Mono case to general problems of water export. Background investigation of the physical setting and historical development of the two basins will be included.

1.19

University of California
Davis, California

STUDY AND DEVELOP HORTICULTURAL METHODS FOR PLANTING, MANAGING AND ENHANCING VEGETATION ON FOREST RECREATION SITES

Andrew T. Leiser

Supported by *State of California*

Objectives:

The objectives include research on the improvement of old declining sites, development of new campsites in forested areas and the development of new sites in areas with relatively little desirable existing vegetation.

Work proposed:

1. Review the problem.
2. Assemble plant lists and guides.
3. Review the literature and consult with others working on the problem.
4. Select initial research sites.
6. Begin pilot research.
5. Outline a continuing research program.

1.21

Clemson Agricultural College
Clemson, South Carolina

FACTORS INFLUENCING THE DEVELOPMENT, PRODUCTION, AND MANAGEMENT OF TURFGRASSES FOR UTILITY, BEAUTIFICATION, AND RECREATIONAL FACILITIES

P. M. Alexander

Supported by *State of South Carolina*

Objectives:

(1) To obtain and evaluate new strains, varieties, and species of turfgrasses for varied uses.

(2) To develop methods for better utilization of turfgrass varieties with respect to production, establishment, and management practices.

(3) To determine the nature and relative importance of major problems in all aspects of turfgrass usage.

Description of work:

(1) Evaluation of new turfgrasses in plots at Clemson and in the Sand Hills and Coastal areas;

(2) Production, establishment and maintenance of turfgrasses will be studied;

(3) Turfgrass problems will be surveyed by direct visitation to sites; questionnaire and consultation with extension personnel.

1.23

Colorado Game, Fish and Parks Department
Box 720 D
Denver, Colorado

SURVEY OF POTENTIAL PUBLIC WATERFOWL SHOOTING AREAS IN COLORADO

Richard M. Hopper

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: Objectives of Segment 11 are (1) to analyze and summarize all data collected during past segments of this job, and (2) to formulate the resulting information into a final job completion report.

Procedures: Analysis and summarization of data will be aimed at producing the following information for which this job was designed: (1) amount of wetlands in the major irrigated portions of Colorado, (2) number and amount of wetland areas leased for hunting, fishing, and other recreational purposes, (3) a method to rate wetland areas in terms of value for acquisition as public hunting areas, and (4) a priority list of public hunting areas for presentation to the Commission. This information will then be compiled in the form of a final report which will cover all past segments of this job.

1.24

Colorado Department of Game, Fish and Parks Research Center
P. O. Box 513
Fort Collins, Colorado

WATER RESOURCES DEVELOPMENT STUDIES

Donald M. Hoffman

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

An inventory type study to evaluate the possible effects of the Costilla Project, Eastdale Reservoir to be constructed by the Bureau of Reclamation in the San Luis Valley of southern Colorado in inundating pheasant range. Studies will be conducted to investigate (1) the possible effects of the reservoir on loss of range, alteration in proportions of available range types, restriction of game bird movements, loss of birds through drowning or traffic hazards, hunter access and hunting, and possible conflicts of interests between hunters and recreationists, (2) possibility for State control of lands within the project and (3) whether means of mitigating losses to and/or enhancing upland game bird values exist and suggest what these might be. Bureau of Reclamation project plans will be studied, existing information on pheasant populations and range will be compiled and evaluated, and on-the-site investigations will be made.

1.25

Colorado Game, Fish and Parks Department
6060 No. Broadway
Denver, Colorado

EVALUATION OF THE IMPACT OF THE COSTILLA PROJECT ON MIGRATORY BIRDS AND HUNTING OPPORTUNITIES IN THE SAN LUIS VALLEY

Richard M. Hopper

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

This job is designed to determine losses in migratory bird habitat, production and hunting that would result from the installation of the Costilla Project. Further, it will determine probable migratory bird benefits and problems derived from the Costilla Project. Management plans and recommendations will be formulated which may be incorporated into the Costilla Project to mitigate and enhance the migratory bird resource and public hunting opportunity in the San Luis Valley.

1.26

Colorado Game, Fish and Park Department
6060 No. Broadway
Denver 3, Colorado

EVALUATION OF THE IMPACT OF THE UPPER SOUTH PLATTE PROJECT ON MIGATORY BIRDS AND HUNTING OPPORTUNITIES IN THE SOUTH PLATTE VALLEY

Richard M. Hopper

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

This job is designed to determine losses in migratory bird habitat, production and hunting that would result from the installation of the Upper South Platte Project. Further, it will determine probable migratory bird benefits and problems derived from the Upper South Platte Project. Management plans and recommendations will be formulated which may be incorporated into the Upper South Platte Project to mitigate and enhance the migratory bird resource and public hunting opportunity in the South Platte Valley.

1.27

Colorado Game, Fish and Parks Department
6060 No. Broadway
Denver, Colorado

EVALUATION OF THE IMPACT OF THE PUEBLO RESERVOIR ON MIGRATORY BIRDS AND HUNTING OPPORTUNITIES IN THE ARKANSAS VALLEY

Richard M. Hopper
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

This job is designed to determine losses in migratory bird habitat, production and hunting that would result from the installation of Pueblo Reservoir. Further, it will determine probable migratory bird benefits and problems derived from Pueblo Reservoir. Management plans and recommendations will be formulated which may be incorporated into the Pueblo Reservoir Project to mitigate and enhance the migratory bird resource and public hunting opportunity in the Arkansas Valley.

1.28

Colorado Department of Game, Fish and Parks Research Center
P. O. Box 513
Fort Collins, Colorado

WATER RESOURCES DEVELOPMENT STUDIES—GRAND MESA PROJECT

Gary T. Myers
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

An inventory type study to evaluate the possible effects of the Grand Mesa Project to be constructed by the Bureau of Reclamation in western Colorado in inundating blue grouse, wild turkey, pheasant, and Gambel's quail ranges. Studies will be conducted to investigate (1) the possible effects of the project on loss of ranges, alteration in proportions of available range types, restriction of game bird movements, loss of birds through drowning or traffic hazards, hunter access and hunting, and possible conflicts of interests between hunters and recreationists, (2) possibility for state control of lands within the project, and (3) whether means of mitigating losses to and/or enhancing upland game bird values exist and suggest what these might be.

The Bureau of Reclamation project plans will be studied, existing information on upland game bird populations and ranges will be compiled and evaluated, and on-the-site investigations will be made.

1.29

Colorado State University
Fort Collins, Colorado

ENVIRONMENTAL FACTORS IN CAMPGROUND REHABILITATION AND PROTECTION

R. E. Danielson and A. D. Dotzenko
Supported by *National Park Service, U.S.D.I.*

Instrumentation is being developed and adapted to characterize the environmental factors of light precipitation and soil moisture, fertility and temperature. Native and introduced plant species are being subjected to broad ranges of these factors under various intensities of recreation use. Plant survival, growth and durability are being evaluated. Survival and growth are being related to environmental factors. These relationships under various intensities of recreational use will be used to develop guidelines to aid in locating, developing, maintaining and rehabilitating intensive use areas.

This Study is being conducted in Rocky Mountain National Park.

1.30

Colorado State University
Agricultural Experiment Station
Fort Collins, Colorado

IMPACT OF LAND USE ON WATER QUALITY WITHIN A FORESTED MOUNTAIN WATERSHED

James R. Meiman
Supported by *Cooperative State Experiment Station, Forest Service, U.S.D.A.*

The objectives of this search project are: (1) to assess present water quality characteristics within a forested mountain watershed and its carrying natural flow regimes, (2) to measure the effects of multiple use management—including road construction, logging, recreational developments, and grazing—on water quality. Water samples will be obtained at regular intervals at selected sites within the 102 square mile Little South Fork of the Cache la Poudre Watershed. Water quality determinations will include total residue, filtrable and non-filtrable residue. PH turbidity, coliform group bacteria and temperature. Measurements will be made before, during, and after the application of various land management practices. During the calibration period various inventories of physical features of the watershed as well as cataloging of type and volume of recreational use will be made.

1.31

Colorado State University
Agricultural Experiment Station
Fort Collins, Colorado

INVENTORY OF FOREST RECREATION RESOURCES IN SELECTED COLORADO COUNTIES

A. T. Wilcox
Supported by *Forest Service, U.S.D.A.*

Objectives:
(1) To inventory existing and potential forest recreation areas of three Colorado mountain counties selected for representative but diverse conditions, and (2) to develop a forest recreation resource evaluation form based upon the environmental conditions characteristic of the study area.

(Note: A companion project in preparation will analyze factors affecting recreation demand and develop criteria for determining demand for forest recreation facilities and services).

Study Procedure: Land-use data relating to forest recreation use or potential use will be collected from existing Federal, State, and local sources for Eagle, Larimer, and Teller counties. Population, traffic and land ownership characteristics and other data which may influence the potential demand for forest recreation or the potential supply of recreation areas and facilities will also be collected.

These data will be summarized and presented as county and/or composite forest recreation resource inventories with pertinent tables, maps, and charts.

Inventory data will be subjected to analysis and preliminary sampling trials to establish bases for developing a recreation resource evaluation form.

1.32

Colorado State University
Boulder, Colorado

INVENTORY AND BIOLOGY OF YELLOWSTONE LAKE AND STREAM FISHES

F. Phillip Sharpe
Supported by *National Park Service, U.S.D.I.*

This series of studies by BSF&W personnel and funding is oriented to developing information necessary for management of the fishery resource in all Yellowstone Park waters. Aside from the basic inventory activity, the investigations include efforts to analyze the dynamics of the trout populations and to identify the basic physical and biological characteristics of the aquatic environments involved. Fish studies include those concerning age and growth, length and weight in spawning run and in the catch, and angler catch records.

1.33

Comeback Inc.
16 West 46 Street
New York, New York 10036

AVAILABILITY AND UTILIZATION OF RECREATION RESOURCES FOR CHRONICALLY DISABLED CHILDREN IN THE UNITED STATES

John E. Silson
Supported by *Welfare Administration, Children's Bureau, HEW*

Problem: Determine the degrees and types of deficiency in recreation programs provided for chronically disabled children; the extent to which these children are excluded from sports and other play essential to their health and mental development; reasons for shortcomings in providing optimum recreation opportunities for this group.

Purpose: Use the findings of the foregoing determinations as guidelines for:

1. Increasing the integration of disabled children into community recreation programs.
2. Planning special programs needed when integration is not feasible.

Methodology: Original method consisted of selecting nine Standard Metropolitan Statistical Areas; directing questionnaires to public and voluntary youth-serving agencies in these areas; and conducting follow-up field visits to amplify information obtained in questionnaires. At request of the Children's Bureau, the project has been expanded to include a Consolidated Metropolitan Statistical Area, in order to determine *if* and *how* patterns of recreation service to disabled children differ in a complex metropolitan community.

1.34

Comeback, Inc.
386 Park Avenue South
New York 16, New York

DEVELOPMENT OF A PLANNED METHOD OF EXPANDING AND USING COMMUNITY RESOURCES FOR RECREATION SERVICES FOR THE ILL AND HANDICAPPED

Beatrice H. Hill
Supported by *Vocational Rehabilitation Administration, HEW*

The purpose of the project is to: (1) develop organized methods for meeting recreation needs of both institutionalized and non-institutionalized ill and handicapped persons, through more effective use of the recreation resources of a community; (2) provide the consultative staff required to conduct the project and demonstrate how two selected representative types of community can be helped to meet this objective; and (3) produce and introduce educational materials and procedural guides for implementing such programs.

The methodology of this three-phase project includes: (1) developing basic guides for assembling and using essential data in establishing a coordinated cooperative procedure for utilizing the recreation resources of a community's various agencies, institutions, and other service groups; (2) demonstrating methods of providing community-wide recreation opportunities for the ill and handicapped; and (3) evaluating and refining procedures so similar communities can use the findings of this project to initiate and maintain such programs.

1.35

Connecticut Board of Fisheries and Game
State Office Building
Hartford, Conn.

A FISHERY SURVEY OF THE CONNECTICUT RIVER AND DEVELOPMENT OF A CONNECTICUT RIVER MAP

Richard Hames

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

A map of the Connecticut River, prepared from Coast and Geodetic Survey maps and Navigation charts, will be made showing the locations of important concentrations of fish, access areas and boat liveries.

1.36

University of Connecticut
Storrs, Connecticut

THE DEVELOPMENT OF RECREATIONAL SPACE STANDARDS OF CORE CITIES AND REGIONS FOR ANY GIVEN POPULATION

Jay S. Shivers

Supported by *University of Connecticut*

The chief objective of this research is to produce a valid, precise and reliable standard by which any incorporated local or regional governmental unit may determine the amount, kinds, and placement of recreational sites in order to meet present and future needs of the people comprising their respective permanent and transient populations.

This research involves the development of time, motion and space studies of people performing the full range of recreational activities demanding area in the outdoors. Cinematographic techniques are employed on a systematic time basis to record the intensity and type of use of recreational facilities. Based on the observations provided, inferences and conclusions about the standards and criteria for effective utilization of recreational space will be developed.

1.37

Cornell University
Ithaca, New York

WATER SUPPLY-DEMAND

David J. Allee

Supported by *Office of Water Resources Research. U.S.D.I.*

Generally, the objective of the project is to provide new or improved knowledge about the supply of water available to New York State and the adjoining states in the Northeast region, including ultimately the influence of Canada, and the demands that will be made on supplies for domestic, municipal, industrial, agricultural and recreational purposes; for the propagation of fish, aquatic life and wildlife; and for other purposes.

Specifically, the objective of the project is to undertake hydrometeorological and engineering analyses, socio-economic investigations, and data processing and programming studies so as to (a) estimate present water use, potential supply and capacity of existing development on a comparable and uniform basis; (b) estimate the supply functions for water (i.e., what each successive increase in developed capacity might cost); (c) construct projections of water use by each water function; and finally match the demand data to the water supply data. Subsequent approximations would aim at refining information with particular emphasis on water supply data and on improving the evaluation of water demand projections, considering the cost of meeting such demands. This project was started in Fiscal Year 1965 and the completion date is indefinite at present.

1.38

Cornell University
Ithaca, New York

WATER AND RELATED LAND RESOURCES-LAW AND POLITICAL INSTITUTIONS

William H. Farnham

Supported by *Office of Water Resources Research, U.S.D.I.*

The law and political institutions, both Federal and State with respect to water and related land resources, will be studied with a view to determining what amendments or additions should be made thereto in order to ensure an adequate water supply and its proper allocation among agricultural, domestic, industrial, recreational, navigational and other users; and to provide the physical controls necessary to drainage and flood damage prevention.

In making this determination recourse will be had not only to published material such as constitutions, statutes, regulations, judicial and administrative decisions, reports of governmental agencies and commissions, and studies by scientists and lawyers, but also to conferences with persons who and organizations which, because of their activities and functions might reasonably be expected to have relevant information: e.g., county agricultural agents, conservation officials, health officers, flood control commissions, irrigation administrators, public service commissions, chambers of commerce, industrial associations, municipal planners, and power companies.

In order to avoid both unnecessary multiple coverage and regrettable gaps in coverage of problems and topics, special effort will be made to establish liaison and cooperation with the many scholars already engaged elsewhere and under different auspices in parts of the work embraced in this project.

This project began in Fiscal Year 1965. The termination date is indefinite at this time.

1.39

Cornell University
Ithaca, New York

EUTROPHICATION IN WATER RESOURCES OF NEW YORK STATE

John P. Barlow
Supported by *Office of Water Resources Research, U.S.D.I.*

Generally, the objective of the project is to develop information about (1) the causes, extent and degree of eutrophication in certain lakes of upper New York State and (2) the effect of man-made influences and land use practices on the rate and extent of eutrophication. Fertilizers, used water from cities and industries, the continued development of dams and other structures designed to control and manage surface waters and the general encroachment by man on the margins of lakes, rivers and bays have contributed to the enrichment and subsequent excessive growth of aquatic plants. These growths may affect navigation; interfere with recreational uses as bathing, boating and fishing; adversely affect property values; create nuisance conditions and affect public health and safety.

1.40

Cornell University Water Resources Center
Ithaca, New York

IMPACT OF WATER-BASED RECREATION

David J. Allee
Supported by *Office of Water Resources Research, U.S.D.I. and N. Y. S. Department of Conservation*

The general problem is how to relate the capacity of water and related land resources to provide recreation services with the growing demand for those services in the context of comprehensive water resources planning. Specifically, selected aspects of relevant biological processes and physical features will be studied to describe the production function for recreation services of one of the New York Finger Lakes and two old flood control reservoirs which have just recently been partly converted to recreation use. Included in this will be a specification of substitution relationships with other water uses, and a review of public and private inputs including institutional changes. In turn those production relationships will be related to estimates of the demand for recreation services and its growth in the service areas of these bodies of water. Measurements and projections of both direct and indirect benefits will be attempted. The objective is to develop, and test, theoretically sound operational planning procedures while adding to our meagre fund of knowledge about water-based recreation, its economics and its technology. Recreation services likely to be most significant are power and sail boating, fishing, park-related services and cottage development.

1.41

Cornell University
Agricultural Experiment Station
Ithaca, New York

MULTIPLE PURPOSE WATER RESOURCE INVESTIGATIONS

L. S. Hamilton
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objective:

To investigate critical multiple-use problems with respect to New York's surface waters, so that information is made available on which to base both private and public policy with respect to the use and development of this vital resource.

Description of Work:

Water-use conflicts are becoming increasingly severe even in the humid East. New York State already is experiencing conflict between irrigation, navigation, recreation, power production, pollution, municipal water supply, industrial use and flood control. Some of these conflicts will be examined as case studies with the goal of criteria for water allocation and policy formulation. The initial case study will be an analysis of municipal water supply reservoirs in New York, focusing on the degree of multiple use of the water and watershed lands.

1.42

Cornell University
Ithaca, New York

THE UTILIZATION OF RURAL LAND IN TOMPKINS COUNTY, NEW YORK

H. E. Conklin

Supported by *State of New York*

This project will provide factual background to aid rural people to develop both private and public programs for more effective utilization of land for both farm and nonfarm purposes.

Description of Work:

(1) Copy property boundaries for all parcels of over 2 acres.
(2) Identify full-time, part-time and spare-time farmers and map the boundaries of the lands they are using. Complete as much of this step as possible from secondary sources and informed persons. Contact farmers for remainder.
(3) Classify full-time and part-time farms both individually and by areas on the basis of income-expectancy appraisals. Identify separately any areas in which long-run income probabilities or possibilities contrast sharply with short-run probabilities or present characteristics, present land use, and land use interests.
(4) Survey a sample of nonfarm land owners to determine their present characteristics, present land use, and land use interests.
(5) Investigate trends in concentrated urban uses, in public and commercial private recreational uses, and in related matters.
(6) Outline alternative general rural development possibilities for the County.

1.43

Cornell University
Ithaca, New York

BIOLOGY AND CONTROL OF FLIES ANNOYING TO MAN AND ANIMALS

J. G. Matthyssee

Supported by *State of New York*

To make laboratory and field studies on the biology and control of houseflies, stable flies, horn flies, and horse flies. To study the biology, seasonal occurrence, and control of species of Chironomus, Chaoborus, and other gnats troublesome to the inhabitants of resort areas, and visitors to park areas in New York.

1.44

Florida Game & Fresh Water Fish Commission
Tallahassee, Florida

LIAISON WITH MOSQUITO CONTROL AGENCIES

E. Dale Crider

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

To familiarize the project with the extent and nature of the mosquito control program in St. Johns, Brevard and Indian River Counties. To exchange research findings of both agencies on vegetation succession and other pertinent data on impoundments, and to express the Commission's interest in their program. Through a cooperative study, investigate the results of waterfowl management practices and mosquito control practices covering permanent water impoundments, dewatered areas and natural fluctuating water areas.

Procedures:

Contacts and discussions with personnel connected with these agencies will be conducted in conjunction with other field work. One day each month will be devoted to field investigations of waterfowl development nature in a cooperative study with the St. Johns Mosquito Control agent in order to provide data on ecological change, wildlife utilization and potentials, and recreational potentials on impoundments and dewatered areas related to waterfowl management practices and in relation to mosquito control activities.

1.45

Florida Game and Fresh Water Fish Commission
P. O. Box 1088
Eustis, Florida

ST. JOHNS RIVER FISHERY PROJECT

Harold L. Moody

Supported by *State of Florida*

The purpose of this study is to monitor fish populations of the entire St. Johns River for fishery conservation purposes.

The rapid rate of human population growth in this section of Florida has produced and is continuing to cause limnological and terrestrial changes, through public works and other activities, which have adverse effects on the fishery of the river. The aim of this study is to define these changes more precisely in order that deteriorations of the fishery may be arrested or prevented.

Fish population samples are taken with various standard fishing gear and by different methods, including chemicals, to determine successive changes in the populations and their species composition which may be related to natural environmental factors, water pollution, or to artificial changes in the habitat. Sudies of sportfisherman success, harvest rates and fishing pressure are also made.

1.47

Georgia Game and Fish Commission
Atlanta, Georgia

CREEL CENSUS—RESERVOIR

Herbert Wyatt
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

1. To determine the species composition of the catch, total fishing pressure and harvest, fishing success, and size groups most frequently caught by anglers.
2. To determine the success of species introduction and predict trends of the fishery.
3. To evaluate reservoir management techniques and compare creel census statistics for all project impoundments.

Procedures:

Lake Seminole will be sampled every year to determine the success of the striped bass introductions. Lake Blackshear will be sampled one year in three.

The census will be conducted with either three or five areas depending on the size of the lake. In order to obtain a sampling percentage above 5%, Wednesdays, Saturdays and Sundays will be sampled twice as heavy as weekdays. A separate analysis of fishing success for the two periods is made to prevent biased results.

The major areas are broken into sub-areas for sampling, utilizing a systematic sample for better analysis of sudden changes in angler success within the fishery. The sub-areas are drawn systematically so they alternate. The sub-area is approximately half of the shoreline distance of the main area.

The sampling day is broken into seven sampling periods of two hours each beginning at 5:00 a.m. and ending 7:00 p.m. All sub-areas can be covered in two hours. Sampling periods are drawn at random for a particular day and matched with sub-areas. The census will be conducted for seven hours each day out of a total of fourteen possible hours. The starting point for sampling each sub-area is the end of the sub-area nearest the clerk when the census should begin.

Statistical expansion of creek data collected to determine total pressure will be with the following simplified formula. Other methods as given under P.S.&E. of F-14-R-3 may be used at the discretion of the investigator to determine variation.

$$P = IN\ (PHA_s)$$

I = Ratio of possible sampling days to days actually sampled.
N = Number of fishermen contacted.
P = Length of sampling period (2 hours).
H = Ratio of possible fishing hours to hours actually sampled (14/7).
A_s = Number of sub-areas sampled (2).

Total catch will be computed by the formula:

$$C = PC_r$$

P = Pressure by the above formula.
C_r = Mean catch rate for the species.

Data will be recorded on standard forms for transfer to punch cards and electronic data processing.

1.48

University of Georgia

SCORP UNIVERSITY OUTDOOR RECREATION RESEARCH STUDY SERIES

James R. Champlin
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

The University Outdoor Recreation Research Study Project is being done to provide basic supportive planning data for the development of the Georgia State Comprehensive Outdoor Recreation Plan. Specialized individual studies are being done in the following areas:

- I. Outdoor Recreation Resources and Facilities
  - A. Environmental Recreation Resources
  - B. Data Processing of Inventory of Recreation Areas and Facilities
- II. Determination and Projection of Demand
  - A. Analysis of Major Factors Influencing Demand
  - B. Population projections and analysis
  - C. Economic Growth analysis
  - D. Recreation Travel and Mobility
  - E. Present Demand Trends
- III. Evaluation of Need
  - A. Analysis of Role of Private Sector
- IV. Special Problems
  - A. Meeting the Needs of Urban Population
  - B. Quality of the Outdoor Environment
  - C. Access to Recreation Resources
  - D. Recreation and Conservation Education
  - E. Meeting the Needs of the Aged and the Handivantaged
  - F. Meeting the Needs of the Economically Disadvantaged

   - G. Recreation Planning Research
   - H. Coordination Among Public Agencies
- V. Action Program
   - A. Financing of Recreation
   - B. Recreation Legislation
   - C. Public Administration of Recreation

1.49

University of Georgia
Athens, Georgia

SPECIAL PROBLEMS RELATED TO THE FIELD OF OUTDOOR RECREATION

James R. Champlin

Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This study will deal with a number of special problems related to the field of outdoor recreation:

A. Meeting the Needs of Urban Populations

B. Quality of the Outdoor Environment

C. Access to Recreation Resources

D. Meeting the Needs of the Aged and the Handicapped

E. Meeting the Needs of the Economically Disadvantaged

F. Recreation and Conservation Education

G. Recreation Planning Research

H. Coordination Among Public Agencies

Library Research and Consultation with State Agencies will be utilized in development of this study.

1.50

University of Georgia
Athens, Georgia

AN ANALYSIS OF THE ROLE OF THE PRIVATE SECTOR

James R. Champlin

Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

The study or report will consist of an evaluation of existing and available data on the scope of private outdoor recreational facilities in Georgia. Questions to be developed and answered are: (1) What role is played by the private sector in meeting overall outdoor recreation needs; (2) What balance exists between the public and private sectors; (3) What outdoor recreation services are basically private operations by their nature; and (4) What facilities can the private sector be expected to provide?

1.51

University of Georgia
Athens, Georgia

ENVIRONMENTAL RECREATION RESOURCES

James R. Champlin

Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

It is *the objective* of this study to consider the outdoor environment of man and identify those parts of it which serve as positive resources for his recreation, and those parts which would negate his recreation. It is further intended that the location of these factors in the environment be identified in the setting of the Nation, the region, and the State. Study will include:

(1) Climate
   a. Temperatures
   b. Precipitation
   c. Storminess
   d. Measure of influence on human comfort
   e. Maps
(2) Geology
(3) Zoology
(4) Botany
(5) Land and Water Use Characteristics
(6) History and Archeology
(7) Scenic Areas
(8) Resource Needs for Special Activities

1.52

University of Georgia
Athens, Georgia

A STUDY OF TOURISM DEVELOPMENT IN THE COASTAL PLAINS AREA

William B. Keeling

Supported by *The Coastal Plains Area Planning and Development Commission*

In search of additional ways to further economic development, small area planning and development commissions discovered that service industries which serve the vacation/recreation travel trade are under-developed.

This project is concerned with finding ways of developing facilities and programs which will stimulate activity in the vacation/recreation industry.

The nine counties in this planning and development area are being thoroughly surveyed to catalogue all facilities, programs and events which attract tourists. The number of tourists that visit the area will be estimated as will the number that merely pass through the area. The attractions tourists visit will be enumerated. The economic impact on travel-serving firms and the whole area will also be estimated.

Things that can be developed into attractions, opportunities for enterprises to serve tourists and programs of activity which could entertain tourists are being sought and outlined. The feasibilities of discovered possibilities are not being studied, however.

The information and suggested developments will be written into a report. Educational meetings will then be held in each of the counties to further insure that developmental possibilities are well known in the area.

The work is conducted through extensive literature review, field interviews, field observations, statistical analysis of highway and economic data from interviews. Additional data will be obtained from local governments, the State Department of Industry and Trade, and the Georgia Department of Revenue and the State Highway Department.

Interviews and observation research are being conducted in the area composed of Berrien, Brooks, Cook, Echols, Lanier, Irwin, Lowndes, Tift and Turner Counties.

1.53

University of Georgia
Athens, Georgia

TOURISM DEVELOPMENT IN THE GEORGIA MOUNTAINS AREA

William B. Keeling

Supported by *Georgia Mountains Area Planning and Development Commission*

In search of additional ways to further economic development, small area planning and development commissions discovered service industries that serve the vacation/recreation travel are underdeveloped.

This project is concerned with finding ways of developing facilities and programs which will stimulate activity in the vacation/recreation industry.

The twelve counties in this planning and development area have been thoroughly surveyed to catalogue all facilities, programs and events which attract tourists. The number of tourists that visit the area are being estimated as are the number that merely pass through the area. The attractions tourists visit are being enumerated. The economic impact on travel-serving firms and the whole area also is being estimated.

Things that can be developed into attractions, opportunities for enterprises to serve tourists and programs of activity which could entertain tourists are being sought. The feasibilities of discovered possibilities are not being studied, however.

The information and suggested developments will be written into a report. Educational meetings will then be held in each of the counties to further insure that developmental possibilities are well known in the area.

The work is conducted through extensive literature review, interviews and statistical analysis of highway and economic data from interviews. Additional data has been obtained from local governments, the State Department of Industry and Trade, and the Georgia Department of Revenue. The field work has been conducted in the area composed of Union, Towns, Rabun, Lumpkin, White, Habersham, Stephens, Dawson, Forsyth, Hall, Banks and Franklin Counties.

1.54

University of Georgia
Athens, Georgia

TOURISM DEVELOPMENT IN THE CHATTAHOOCHEE-FLINT AREA

William B. Keeling

Supported by *Chattahoochee-Flint Area Planning and Development Commission*

In search of additional ways to further economic development, small area planning and development commissions discovered that service industries that serve the vacation/recreation travel trade are underdeveloped. This project is concerned with finding ways of developing facilities and programs which will stimulate activity in the vacation/recreation industry.

The seven counties in this planning and development area will be thoroughly surveyed to catalogue all facilities, programs and events which attract tourists. The number of tourists that visit the area will be estimated as will be the number that merely pass through the area. The attractions tourists visit will be enumerated, and the economic impact on travel-serving firms and the whole area will be estimated.

Things that can be developed into attractions, opportunities for enterprises to serve tourists and programs of activity which could entertain tourists will be sought and enumerated. The feasibilities of discovered possibilities will not be studied, however.

The information and suggested developments will be written into a report, then educational meetings will be held in each of the counties to further insure that developmental possibilities are well known in the area.

The work is conducted through literature review, field interviews, and statistical analysis of highway data and economic data from interviews. Additional data will be obtained from local governments, the State Department of Industry and Trade, and the Georgia Department of Revenue. The field work has been conducted in the area composed of Carroll, Coweta, Heard, Harris, Talbot, Troup and Meriweather Counties.

1.55

Harvard University
Cambridge, Massachusetts

SOME EFFECTS OF LANDSCAPE ENHANCEMENT ON TIMBER PRODUCTION

Ernest M. Gould
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Object: To improve systems for studying rational allocation of the resources needed to generate a satisfactory flow of products and services from a forest environment. Specifically, the research will be concerned with two competing uses of the forest: timber production and the natural beauty of forest landscapes.

Plan of work: An existing computer based model developed by the US Forest Service will be used to make an initial analysis of alternative land management programs. This should lead to an improved model and a more refined evaluation of alternatives. The systems analysis to be used provides the ability to define criteria and develop models which in turn specify the information needed to arrive at interim solutions. The present Harvard University Fortran Forest Simulator (HUFFS) will be used to obtain the first "solution". HUFFS will be operated for a given forest environment to discover the impacts that landscape design considerations will have on timber production. In light of the information gained during the research, the HUFFS will be modified to facilitate further analysis of management alternatives.

1.56

Department of Planning and Economic Development
Honolulu, Hawaii

HAWAII STATE COMPREHENSIVE OUTDOOR RECREATION PLAN

Shelley M. Mark
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This project will investigate all phases of existing and proposed outdoor recreation, both urban and non-urban, of the State, its political subdivisions, the Federal Government, and private interests, including but not limited to, forests, reservoirs, lakes, rivers, sea shorelines, multiple-use areas, farms, hunting preserves, refuges, parks, natural areas, historic and cultural sites, and other significant outdoor recreation areas. It will consider such activities as hunting, fishing, skiing, hiking, camping, picnicking, pleasure driving, boating, swimming, golfing, and other forms of outdoor recreation in which people of the State, including handicapped and underprivileged, may participate in. It will serve as a guide for enhancing and preserving the natural beauty of the islands and its recreational areas. It also will consider and take into account the coordination of the activities of all agencies of the State, Federal, and county governments relating to outdoor recreation.

The plan will attempt to project estimated general recreation information for the State to 1985, based both on an analysis of present use of areas and facilities and on trends in population, income, leisure time, mobility, recreation habits, and interests.

More detailed and specific demand and programmed facilities data will be provided for the next five-year period. Assuming the Plan effectuation is to begin in early 1968, this will cover the period to 1972.

In accomplishing the above, efforts will be made towards investigating the feasibility and possible methodology for utilizing an Automatic Data Processing system following or adapted to that utilized in the national survey in maintaining recreation inventory and investigating and analyzing methodologies, concepts and alternatives for accommodating and integrating national concerns in programs for highway beautification, preservation and enhancement of natural beauty, and the handicapped and underprivileged in Hawaii's outdoor recreation areas and facilities.

1.57

University of Hawaii
Agricultural Experiment Station
Honolulu, Hawaii

FERTILIZATION AND CULTURE OF HAWAII TREE CROPS

Y. N. Tamimi
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

1. To determine the nutritional deficiencies of commercial trees under Hawaiian ecological conditions.
2. To determine the feasibility of mineral fertilization of Hawaii arboreal crops.

In test plots to be established at Branch Experiment Stations in the major ecological zones of the State, the nutritional requirements of potentially useful arboreal plants will be determined. Trees and shrubs will be evaluated under various cultural and nutritional treatments for potentials as lumber, posts, windbreaks, ornaments, watershed, erosion control, wildlife and recreation.

1.58

Humboldt State College
Arcata, California

ANALYSIS OF RECREATION POTENTIAL IN A SECOND-GROWTH REDWOOD STAND IN NORTH COAST REGION OF CALIFORNIA

William F. Murison
Supported by *Forest Service, U.S.D.A.*

Objective: By a study in detail of a specific tract of second-growth redwood forest held for recreational purposes, guidelines for recreational use and development of other areas similar as to forest cover, ownership and accessibility will be drawn.

Procedure: A detailed survey of the physiography, soils and vegetation and current recreational use of the area (80-100 acres) will be undertaken. Both cartographic and tabulated presentations of data collected are envisioned.

Plans and proposals for the use and recreational development of these lands will be formulated. The coincidence or conflict between various recreational pursuits will be mentioned as will the friction points between recreation and possible timber production on these areas.

1.59

Illinois Natural History Survey
Urbana, Illinois

RESEARCH ON ECOLOGY OF SPORT FISH AND SPORT FISHERY MANAGEMENT IN ILLINOIS

R. Weldon Larimore
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

(1) To compare the present fish population with that reported in the Illinois Natural History Survey Bulletin entitled "The Fishes of the Kaskaskia River," published in 1930.

(2) To observe and measure the changes in the fish population due to the construction of the two large mainstream reservoirs, one of which is now partially full.

(3) To work out the annual growth pattern, reproductive cycle, causes for variation in population success, and food competition of the most important fishes.

(4) To determine the value of the floodplain ponds and the tributaries to the sport fishery, and their contribution to the river populations.

(5) To determine the effects of domestic and industrial pollution on the aquatic communities.

(6) To study the physical-chemical conditions in the river and in the reservoirs and their relationship to development of aquatic communities, sport fishing, and aging of the reservoirs.

(7) To measure seasonal abundance of benthic fauna and relate it to the changes in drift organisms and fish food habits.

(8) To estimate the sport fishery, and rates of exploitation of fish stocks.

Procedures:

The work planned on the Kaskaskia River watershed is as follows:

(1) Five permanent collecting stations have been established along the course of the Kaskaskia River. These are located as listed below, from the headwaters to near the mouth.

A. Above the area that will be inundated by the Shelbyville impoundment.

B. In the area that will be inundated by the Shelbyville impoundment.

C. Below the Shelbyville dam and above the area that is being inundated by the Carlyle dam.

D. In the area that is being inundated by the Carlyle impoundment.

E. Below the Carlyle dam.

(2) Each station will be worked each month throughout the year. Physical and chemical measurements will be made. Fish, benthos, and drift organisms will be sampled.

(3) Between eight and eleven rotenone collections at previously sampled stations will be taken along the whole length of the river during August.

(4) Collections by means of boat shocking, D. C. hand electrode shocking, and seining will be taken in the floodplain ponds along the total length of the river during the summer and at selected ponds during the entire year.

(5) Seine hauls will be made at numerous stations to extend the information on species distribution.

(6) Electrofishing, traps, and nets will be used throughout the year in the reservoirs to reveal the development of the lake populations.

(7) Other studies connected with Kaskaskia River fishes, such as growth, food, and reproduction, will be conducted on preserved individuals, spines, and scales during the winter.

1.60

Illinois University
Urbana, Illinois

WOODY AND HERBACEOUS PLANTS FOR ROADSIDE GROUND COVER

C. J. Birkeland

Supported by *Illinois Division of Highways and U. S. Bureau of Public Roads*

A study is being made of plants now available in nurseries to select those which will provide the best possible ground covers to control erosion of raw soils on steep slopes and produce the most rapid and attractive cover possible.

1.61

Kansas Forestry, Fish and Game Commission
Pratt, Kansas

GENERAL SURVEYS OF WATERS

Roy Schoonover

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective: To inventory state waters.

Segment Objectives:

1. To compile historical information affecting the fishery.
2. To determine physical characteristics affecting the fishery.
3. To determine chemical characteristics affecting the fishery.
4. To determine biological characteristics affecting the fishery.
5. To determine present fishermen utilization and angling success.
6. To select stream-sections having the highest potential for supplying angling needs through acquisition of permanent easements for public fishing success.
7. To determine suitability of stream-sections for public fishing rights on basis of accessibility, availability of areas suitable for development of parking and minimum day-use facilities.
8. To determine ownership of land along stream-sections selected as having potential for acquisition of public fishing access.
9. To determine owner-viewpoint toward possible negotiations by the Forestry, Fish and Game Department to obtain permanent easements to acquire public fishing access.

Procedures:

1. Historical information will be compiled from the following sources, and pertinent data analyzed.

a. Geology — publications and records of the State Geological Survey and the U.S. Geological Survey.

b. Climate — publications of U.S. Weather Bureau and State Department of Agriculture.

c. Hydrology — records of State Water Resources Board, State Division of Water Resources, State and U.S. Geological Survey, Corps of Engineers and Bureau of Declamation.

d. Principal land uses and vegetative cover types — publications and records of Kansas State University (School of Agriculture and Agricultural Extension Division), State Department of Agriculture, U.S. Soil Conservation Service and U.S. Department of Agriculture.

e. Watershed management — publications and records of the U.S. Soil Conservation Service, Bureau of Reclamation, Kansas State University, and State Board of Agriculture.

f. Previous fishery investigations — publications and records of Kansas Forestry, Fish and Game Department, State colleges, universities, and Fish and Wildlife Service.

g. Present fishery management programs — publications and records of the U.S. Soil Conservation Service, Bureau of Reclamation, Kansas State University, and State Board of Agriculture.

h. Existing and planned developments for access, recreation facilities, and creation of new impoundments — publications and records of Corps of Engineers, Bureau of Reclamation, State Water Resources Board, State Park Authority, Fish and Game Department, and local (city or county) plans or programs.

i. Pollution — publications and records of State Board of Health, and Fish and Game Department.

2. Physical characteristics to be considered, and procedures to be followed in making the studies, analyses and presentations are outlined below:

a. Watershed conditions — visual observations to gather information (in addition to that compiled from reference sources as historical information) on soils, topography, erosion, land-use practices, soil conservation measures and vegetative cover types.

b. Tributaries — will be studied from maps, followed by visual observations to determine size, flows, fishery potential and fisherman utilization. Tributaries having significant fishery value will also be included for survey as scheduling permits.

c. Basin (shoreline and bottom; stream banks and channel) — visual observations to obtain information on geology and soils, slopes, and vegetative cover of shoreline and channel-bank areas. Bottom is to be classified as to depths and composition as described by Welch, Lagler, and others. Width of channels and length of pool and riffle sections will be estimated, with actual measurements of representative sections to maintain accuracy. Areas of impoundments will generally be available from engineering data and reference publications.

d. Hydrology — contributing flows and consumptive uses of water will be determined from historical records when available. In specific instances, where published material or records are not available, but where additional information is believed essential, float method measurements will be used to determine velocity and volume of water. Annual evaporation rates will be obtained from available published data.

1.62

Louisiana State University
Agricultural Experiment Station
Baton Rouge, Louisiana

THE ROLE OF LARGE PRIVATE FOREST OWNERSHIP IN OUTDOOR RECREATION IN LOUISIANA

Robert W. McDermid

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

The objectives are: (1) to compare contributions of industrial and non-industrial forest ownership to outdoor recreation, (2) to determine localities where there are planned recreational developments, (3) to learn which segments of the public are sought as recreational clientele, (4) to determine the acreage of forest land open to public recreation, (5) to ascertain what types of recreation facilities are available to the public, (6) to uncover problems caused by recreationists, and (7) to obtain landowners' opinions as to who should provide additional recreational facilities.

The work proposed will be to determine the names of all owners of 15,000 acres or more of forest land in Louisiana, to interview each of these landowners using a detailed questionnaire, and to analyze the data so obtained on the IBM 1620 computer. Important variables will be isolated. Chi-square and correlation analysis will be used to determine statistical significance of results. If the findings are significant, they will be published in appropriate media.

1.63

Louisiana Wildlife and Fisheries Commission
Capitol Station
Baton Rouge, Louisiana

INVESTIGATION OF LAKE D'ARBONNE

James T. Davis

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

1. To determine the species and quantity of fish present in the lake after impoundment.

2. To determine utilization and quality of sport and commercial fishing as the lake proceeds from infancy.

3. To determine the benthic organisms present and their relative density.

4. To determine the effect of the lake on the economy of the area.

Procedure:

Fish population samples will be taken with trammel nets, hoop nets and electric seines. Rotenone samples for determination of standing crop will be taken in ten (10) locations during the year.

Benthos samples will be taken by a Peterson dredge at twenty (20) sampling stations on the lake. In addition two areas will be sampled to determine the rate at which benthic organisms populate a new area.

The study of the economy of Farmerville and the surrounding area will be continued following the same general plan previously reported on. A survey of land evaluation is scheduled in 1967. This survey will be requested through the Branch of Realty in the Atlanta Regional Office of the Bureau of Sport Fisheries and Wildlife.

1.64

Maine Department of Inland Fisheries and Game
State House
Augusta, Maine

WETLANDS INVENTORY

Kenneth H. Anderson

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: Appraise, classify, and catalogue existing and potential wetlands.

Procedure: Locate, by use of aerial photographs and topographic maps all wetlands, and all potential wetlands 10 acres or more in size. Classify the existing and potential wetlands according to the standards described in the Fish and Wildlife Service Wetland Inventory. Catalog existing and potential wetlands according to location, size, classification, primary use, value, management potential, and vulnerability, in accordance with procedures established in the manual developed under Job C-8, Project W-37-R-11.

1.65

University of Maine
School of Forestry
Orono, Maine

A RECREATIONAL STUDY OF THE UPPER ST. JOHN RIVER WATERSHED

Jeffrey L. Hengsback
No Formal Support

This study will terminate in alternative recreational plans for an 800,000-acre area of privately owned timberland in the northwestern corner of Maine. The plans will provide for extensive recreational use compatible with intensive recreational use and intensive forest management. In addition to the support of the land owners the two-year study is being conducted with the cooperation of the Maine Forest Service, and the game and fish biologists and wardens of the Department of Inland Fisheries & Game, State of Maine.

The recreational potential from the private development aspect will be studied through field work, during the two summer seasons, as well as interviews and data analysis plus some additional field work in the winter seasons. Population projections for the Northeast, Quebec and New Brunswick for 1968, 1975 and 2000 will be used to prepare low and high use projections for the study area. Recreational development corresponding to anticipated use levels will be made, each containing its own financial analysis for the investment estimated.

Items such as fire control, logging roads, public relations, cutting practices, and fish and game management, as they will be affected by increased recreational use of the area, will also be discussed.

1.66

Maryland Department of Game and Inland Fish
Annapolis, Maryland

LITERATURE AND DATA COMPILATION FOR MARYLAND RESERVOIRS

W. R. Carter, III
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

1. To compile for reference in one volume, all presently available knowledge concerning Maryland's reservoirs.
2. To provide parallel information concerning the reservoirs on numerous points, e.g.
    a. fish populations.
    b. aerial fluctuations through seasons.
    c. fishing success for given species.
    d. descriptions of dams.
    e. histories of reservoirs management.
    f. recreational facilities available.
    g. previously available limnological data.
    h. recreation regulations.
3. To facilitate, through this compilation, dissemination of reservoir information to all interested parties.
4. To provide starting points for future research in Maryland's reservoirs.
5. To maintain, in working form, a current file on forthcoming plans for new impoundments in order to be able to recommend desirable recreational features into their development.

Procedures:

1. Communication with the constructing and operating agencies of all dams for acquisition of necessary knowledge.
2. Liaison with the U.S. Corps of Engineers on pending projects in the Maryland area.
3. Continuing review and organization of information into a cross-referenced system, such that reservoirs may be considered singly for all points, or that all reservoirs may be considered with regard to a single point.

1.67

University of Maryland
College Park, Maryland

ENHANCEMENT OF RECREATIONAL USES OF ESTUARINE WATERS THROUGH STUDY OF POTENTIAL CONTROL METHODS FOR STINGING SEA NETTLES

David G. Cargo
Supported by *Office of Water Resources Research, U.S.D.I.*

Sea nettles, with trailing tentacles heavily armed with stinging cells, seriously interfere with swimming, diving and boating in the Cheaspeake Bay and other estuaries. In years of abundance, they are seriously detrimental to the economy of the resort areas and to the recreational activities of the public.

Research will be undertaken by the Chesapeake Biological Laboratory to complete the present imperfect knowledge of the principal species, evaluate the role of these organisms in the ecology of the estuaries, examine the relationships which appear to exist between water quality and nettle abundance, and develop and test potential chemical and biological methods for reducing their abundance and the damage they inflict on individuals and on the economy of affected areas.

1.68

University of Maryland
Agricultural Experiment Station
College Park, Maryland

AN ANALYSIS OF THE FACTORS AFFECTING THE STATUS OF PRIVATE FOREST RECREATION DEVELOPMENT IN GARRETT COUNTY, MARYLAND

Irwin R. Jahns

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives:

(1) To determine the extent to which forest land has been diverted from traditional forest production to recreationally oriented individual interests. (2) To identify and describe the characteristics and uses of forest land that has been diverted to individually owned recreational property. (3) To establish the factors associated with the diversion and use of recreationally oriented private forest property.

Description of Work: The principal sources of data will include: (1) county tax and deed records; (2) topographical and soil surveys; (3) interviews with informed persons in the fields of forestry, recreation and agriculture; and (4) a survey of individual nonresident landowners. Non-residentially owned private forest land not associated with farm enterprises will be identified and studied. Data relating to the history, status and characteristics of forest recreational property will be obtained from county and cooperating agency records and personnel.

Additional data relating to property characteristics and landowners will be obtained through a mail survey of a representative sample of nonresident owners. These data will provide the basis for more detailed statistical analyses in obtaining Objective 3.

1.69

Massachusetts Division of Fisheries and Game
Westboro, Massachusetts

CREEL CENSUS AND ANGLER COUNTS

Robert S. McCaig

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To collect samples of catch data and angler usage on the Connecticut River for the purposes of estimating total angler pressure and harvest. Accumulated data will subsequently be made use of to formulate and guide future management of the fisheries resource and to evaluate this resource in the future for multiple recreational development of the Connecticut River in Massachusetts.

Procedure: Because of the length of the main stream, roughly 68 miles in Massachusetts, the Connecticut River has been divided into three segments for study. The first segment, from the New Hampshire-Massachusetts boundary to the confluence of the Deerfield River, a distance of 17.7 miles, and the second segment, from the Deerfield River confluence south to the Holyoke Dam, a distance of 33.8 miles (plus 2.6 miles of Oxbow Lake at Northampton) have each been studied for a period of one year in 1964–65 and 1965–66 respectively. The purpose of the plan herein detailed for 1966-67 is to investigate the fisheries resources and their utilization in the third segment, extending from the Holyoke Dam to the Connecticut-Massachusetts boundary, a distance of 15.7 miles.

To specify the location of census and count data, the third segment has been divided into sections which are subdivided into stations as follows:

Section A: Holyoke Dam to, but not including, the confluence of the Chicopee River.

- Station 1. Holyoke Dam to the Willimansett Bridge
- Station 2. Willimansett Bridge to Jones Ferry Pumping Station
- Station 3. Jones Ferry Pumping Station to the confluence of the Chicopee River.

Section B: Chicopee River confluence to, but not including, the Westfield River confluence.

- Station 1. Chicopee River confluence to North End Bridge
- Station 2. North End Bridge to Memorial Bridge
- Station 3. Memorial Bridge to Westfield River confluence.

1.70

University of Massachusetts
Amherst, Massachusetts

SURVEY AND EVALUATION OF SMALL ARTIFICIAL RECREATIONAL PONDS IN CENTRAL MASSACHUSETTS

James A. McCann

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Construction and utilization of small artificial ponds in Massachusetts have increased rapidly during the postwar period. Fish management policy of these ponds has been based on data obtained in studies outside the general New England area.

This study is designed to increase our present knowledge of the importance of small artificial ponds as a source of recreation in Massachusetts and to develop a concrete fish management program for these ponds for the area. The project will be divided into three phases:

Phase I, to locate, enumerate, and classify by type artificial ponds in central Massachusetts; Phase II, to select representative ponds and conduct detailed seasonal, physical, and biological studies; Phase III, to establish controlled model ponds and evaluate various management policies formulated through the findings of the first two phases.

1.71

University of Massachusetts
Amherst, Massachusetts

A SURVEY AND EVALUATION OF SMALL ARTIFICIAL RECREATIONAL PONDS IN CENTRAL MASSACHUSETTS

James A. McCann
Supported by *Office of Water Resources Research, U.S.D.I.*

The general purpose of this project is to collect and interpret data on the utilization and management of small artificial ponds in Massachusetts. The study is divided into three phases. Phase I is to conduct a survey of central Massachusetts, using aerial photographs and the official records of the Bureau of Sport Fisheries and Wildlife and the U.S. Soil Conservation Service. This survey will involve locating, enumerating and classifying these small ponds by type, usage and limnological characteristics. Phase II will involve the selection of representative ponds on which will be conducted seasonal detailed physical, chemical and biological studies to determine critical periods or conditions for the survival of fish life. Phase III will involve the concentration of research activities on the management problems encountered in Phases I and II. Phase III will be conducted on controlled experimental ponds under intense observations.
The project will start July 1, 1965 and Phases I and II will be completed in Fiscal Year 1968. Phase III will be a continuing study associated with the research activities of the Massachusetts Cooperative Fishery Unit.

1.72

MacDonald Training Center Foundation, Inc.
4424 Tampa Bay Boulevard
Tampa, Florida 33614

"YOU'RE IT"—A TRAINING FILM FOR RECREATION LEADERS WORKING WITH THE MENTALLY RETARDED

Alden S. Gilmore
Supported by *Vocational Rehabilitation Administration, HEW*

It is *the purpose* of this project to produce a twenty minute, 16mm, sound motion picture film in color to illustrate effective techniques of recreational leadership with the mentally retarded. The film will have as its goal the introduction and orientation of volunteer workers and others to the special problems and methods of working with the mentally retarded.

It will be designed so that it may be used alone or in conjunction with newly prepared programmed materials for training of volunteer workers with the retarded developed under a grant to the MacDonald Training Center Foundation by the Vocational Rehabilitation Administration (VRA Project No. RD–1290).

The proposed film will review and illustrate basic principles of recreational leadership with three chronological age levels of the mentally retarded: the young retarded child, the school age retardate, and the young adult mentally retarded.

1.73

University of Miami
Miami, Florida

FISHERY DYNAMICS, FLORIDA BAY

James B. Higman
Supported by *National Park Service, U.S.D.I.*

Analysis of commercial and sport marine fishing efforts in relation to catch success in Florida Bay, Everglades National Park, species represented and frequency of representation, relation of fishing pressure to levels of fish stocks, and life history studies of selected marine and estuarine species.

1.74

University of Michigan
Ann Arbor, Michigan 48104

THE RECREATIONAL USE OF INDUSTRIAL FOREST LANDS IN CERTAIN COUNTIES OF MICHIGAN'S UPPER PENINSULA

Grant W. Sharpe
Supported by *Forest Service, U.S.D.A. and Michigan Technical Faculty Research Council*

A survey related to public recreational use of private forest lands, with emphasis on factors encouraging and discouraging recreational use.

1.75

University of Michigan
School of Natural Resources
Ann Arbor, Michigan 48104

INCORPORATING SCENIC CONSIDERATIONS INTO HIGHWAY INVESTMENT DECISIONS

S. Philip Shapley

Supported by *Forest Service, U.S.D.A.*

My Doctoral Thesis examines the problem of incorporating scenic considerations into highway investment decisions. In particular, it is hoped specific recommendations can be made as to how scenic considerations can be included in the highway planning process so that the total benefit of a road society is maximized, given a budget constraint. Economic and political science theory suggest how we should approach this problem.

The specific gains that roads provide to society can be classified into:

1. A scenic experience (or more broadly, a positive driver response)
2. Safety
3. Traffic movement

In providing for these specific gains in highway plans, the landscape architect and highway engineer are key individuals. The working relationship between these two individuals and the decision mechanism for choosing among alternative highway plans with different gain levels, are important if we are to approach maximum total benefit from our roads, given a budget constraint.

Therefore, I am studying how the architect can best fit into the highway planning process. The problem of whether the architects' concepts of what produces a scenic experience in highway users are correct and is receiving attention.

Results indicate there often is a conflict between the goals of scenic experience versus safety and traffic movement. Means of settling these conflicts are being examined.

1.76

University of Michigan
Ann Arbor, Michigan 48104

INTERPRETATION OF THE ANCIENT BRISTLECONE PINE FOREST AND THE WHITE MOUNTAINS OF CALIFORNIA

Richard A. Kuehner and Grant W. Sharpe

Supported by *University of Michigan*

To design a program for interpretation of the Ancient Bristlecone Pine Forest, which houses the "Oldest Known Living Thing."

The objectives:

1. To determine what types of interpretive media to use.
2. To select goals for effective interpretation.
3. To define and discuss the range of subjects that might be included in the interpretive program.

1.77

University of Michigan
Ann Arbor, Michigan 48104

OPEN SPACE RESERVATIONS IN SUBDIVISIONS—A CASE STUDY IN PROVIDING LOCAL RECREATION LANDS

Grant W. Sharpe and Terry W.Hoffman

Supported by *University of Michigan*

A case history of a tract of farm land near Flint, Michigan, being considered for subdivision. Under consideration are such factors as the natural history of the area, local tax structure, cluster developments, home associations, and local recreation agencies.

1.78

University of Michigan
Ann Arbor, Michigan 48104

ORGANIZATIONAL ARRANGEMENTS IN URBAN RIVER BASINS TO PROVIDE RECREATION AND POLLUTION CONTROL

Spenser W. Havlick

Supported by *University of Michigan*

This research activity is an analysis of major impasses in establishing organizational arrangements in an Urbanized River Basin. Primary emphasis is directed toward devising mechanisms which will more effectively cope with a trio of river basin problems typical of watercourses in metropolitan regions. The problems under scrutiny are increasingly inadequate outdoor recreation facilities, water pollution and flooding. The Milwaukee River of Southeastern Wisconsin is the focus for this research endeavor.

1.79

University of Michigan
Ann Arbor, Michigan 48104

A STUDY TO INVESTIGATE THE FEASIBILITY OF INTEGRATING SOCIAL AND PHYSICAL FACTORS OF LAND USE IN A RECREATION PLANNING PROCESS

Herbert Giesbrecht

Supported by *University of Michigan*

The object of this study is to identify a need for and problems of integrating physical and social aspects of land use in a design solution to land resource planning.

More specifically, the intent is to demonstrate that a conscious concern for the social aspects of land use, when properly integrated with physical design techniques can result in an improved land planning process.

The procedure will involve an analysis of the physical design and social factors of several case studies, and an attempt to integrate these factors in a planning process model. It will also include a consideration of the implications of this integrated approach, on the practical planning process as applied to outdoor recreation.

1.80

University of Michigan
Ann Arbor, Michigan 48104

IMPLICATIONS OF WILDERNESS VALUES IN THE NATIONAL PARK SYSTEM

Grant W. Sharpe and Robert Broderick
Supported by *University of Michigan*

A study concerned with the conflicts of basic park policy and public attitudes after natural catastrophic phenomena inflict damage on a natural area.

1.81

University of Michigan
Ann Arbor, Michigan 48104

FACTORS CONTRIBUTING TO MORE EFFICIENT RECREATION PLANNING FOR MICHIGAN'S STATE FOREST CAMPGROUNDS

Grant W. Sharpe and Charles F. Krebs
Supported by *State of Michigan*

This study seeks to:

1. Determine adequecy of present forest campground design and facilities to meet present needs for various camper interests.
2. Reasons for campers' selections of various sizes and locations of forest campgrounds.
3. Changes in preferences, equipment, and space requirements of campers as indications of future campground location and design.

1.82

Midwest Research Institute
425 Volker Boulevard
Kansas City, Missouri 64110

COLORADO COMPREHENSIVE PLAN FOR OUTDOOR RECREATION

W. R. Cheney
Supported by *Bureau of Outdoor Recreation, U.S.D.I. and Colorado Game, Fish & Parks Department*

Objectives of this project are to develop local participation data from primary sources to be used in updating the Demand, Supply, Needs, and Action portions of the Comprehensive Outdoor Recreation Plan for Colorado. Data from a study of the Economic Impact of Hunting and Fishing Activities by resident population are also being collected for use in a separate study as well as inclusion in the plan.

Procedure:

Personal household interviews are being conducted on a Statewide basis. Households are selected on the basis of a random sampling plan stratified by county, region, and S.M.S.A. Data will be projected on the basis of current population studies to the years 1970, 75, 80, 90, 2000, 2010, and 2020 for the Recreation Study. These projections, when compared with measures of existing and potential supply, will be used as the basis for need statements now and in the future. The project was started in fiscal year 1967-68.

1.83

Midwest Research Institute
425 Volker Boulevard
Kansas City, Missouri 64110

COLORADO OUTDOOR RECREATION STUDY

Bill Cheney
Supported by *State of Colorado*

This study is one element being prepared as a part of Colorado's Comprehensive Development Plan. Inventory and final presentation are the responsibility of the two State agencies under an inter-agency agreement. Demand and standards will be prepared under a contract with the Midwest Research Institute, located in Kansas City. The study is funded, in part, under the 701 program of the Department of Housing and Urban Development. Principal elements of the work program are:

1. Inventory: Listing by regions of the public and private recreational facilities.
2. Demand: Analysis of current demand and projection of future demand, based upon a Statewide random sample household interview.
3. Plan and Standards: Preparation of State outdoor recreation plan; identification of State responsibility; and development of standards.

1.84

Midwest Research Institute
425 Volker Blvd
Kansas City, Missouri 64110

COMPREHENSIVE OUTDOOR RECREATION PLAN, STATE OF MISSOURI

Joseph C. Horvath
Supported by *State of Missouri*

For this second generation plan, a complete inventory of public and private recreation areas and their facilities was made. On the demand side: the Missouri Recreation Survey 1966 was designed and it reached 14,932 persons on a randomly selected stratified sampling. The base was the county, within that, cities, towns, and census tracts. The data collected on a family base, as of adult male, female and children 6 years and over. Thirty recreation activities were identified and their weighted average participation rates (on 14 recreation region base) were compared to the annual maximum carrying capacities of the facilities and resources of the recreation areas. This was also done for each county as well as for the State as a whole, and for the major agencies (State and Federal) providing recreation opportunities. The comparison revealed neither need nor idle capacity. Projections were calculated in demand and supply as well — comparison was also made for the years 1980, 2000, and 2020. This need or idle capacity figures were then converted into land and water acreages needed or idled for the same terminal years. Over 3 million different bits of data are on file summarized and analysed for planning use. Three volume Statistical Summary, with over 914 pp., houses this data bank.

In addition, research was done on many other topics related to recreation, including socioeconomic characteristics, leisure time, out-of-State demand, wild river systems in the State, etc. Inclusion of the functions and close to 1,000 agencies, commissions, associations, individuals and ideas was made on a contributing basis to the Plan.

1.85

Minnesota Conservation Department
Division of Game and Fish
St. Paul, Minnesota 55101

STATEWIDE LAKE AND STREAM INVENTORY

Stanley Daley

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

This job is intended to compile physical, chemical, and biological information pertaining to lakes and streams in such a manner as to make such available for future planning of fish and game programs. Much of this information is contained in individual lake and stream survey reports and in some watersheds it has been compiled and summarized in watershed reports.

Such compilations as will be made will result in a series of lake and stream summary sheets each containing a synopsis of the salient features of each body of water. As a second step, these data will be transferable to machine tabulation code sheets where the data can be readily sorted and tabulated in many ways.

The procedures to be used will include summarization of material to be obtained from the following sources:

1. Central lake and stream survey files
2. Lake and stream management files
3. Regional fisheries and game operation files
4. Regional and area managers personal knowledge
5. Local game wardens, forestry personnel and other reliable sources
6. Field surveys where needed to collect the minimum of information

In all cases certain information will be required whereas the remaining data will be summarized only when available.

Following this inventory, it is intended that future plans can be made for surveys of lakes and streams according to need. Separation of various lake and streams can be made according to type and location, public access facilities will be readily summarized by location, type of water, size of area, etc., and many statistics on lakes, streams, their classification, potential, current use and facilities.

The amount of work involved is considerable since the tabulation will involve about 15,300 lake basins as tallied in the recent Division of Waters inventory of lakes. No such tabulation is available from streams but it is expected that they may number between 500 and 1000 when the intermittent streams are omitted. Summary forms and instructions will be provided.

1.86

Minnesota Division of Game and Fish
Centennial Bldg.
St. Paul, Minnesota 55101

A STUDY OF HUNTING AND DUCK POPULATIONS ON A SELECTED AREA IN WEST-CENTRAL MINNESOTA

Norman Ordal

Supported by *State of Minnesota*

The purpose of this investigation is to better our understanding of the specific relationships of ducks, both resident and transient to hunting situations within a representative block area of western Minnesota.

Techniques:

1. Estimates of harvest rates on resident ducks in comparison to transients will be gained from returns from bands placed on locally-raised birds as opposed to those from pre-season banding of transients.
2. Pre-hunting season population levels and distribution were obtained by aerial census.

3. On the opening weekend of the duck hunting season distribution, number, and success of hunters on the study area were obtained by aerial car counts, hunter report card distribution, and hunter bag checks.

4. An aerial census of the number and distribution of ducks was made immediately after the opening week end of hunting.

5. An estimate of hunter distribution and numbers during the balance of the season was made by periodic aerial car counts.

6. An inventory of quantity and types of wetland habitat within the study area will be made for the purpose of relating duck use to habitat. A survey of land ownership and use of private wetlands by hunters will be done at the same time.

1.87

Minnesota Division of Game and Fish
St. Paul, Minnesota 55101

STUDY OF THE FEEDING PATTERNS OF AND HUNTING PRESSURES ON WATERFOWL ATTRACTED TO A SANCTUARY

Robert Benson
Supported by *State of Minnesota*

This is essentially a study of the effect of various management practices designed to attract and hold migrating geese on the State-owned Lac QuimParle Game Refuge and Public Hunting Grounds. Periodic inventories and observations on utilization of the sanctuary, flight patterns, feeding sites, availability of food, shooting pressures, and reactions of the birds to hunting are all part of the study.

Management of the refuge for geese began in 1958. Censuses and bag checks preceded this by two years and more intensive studies have been made each fall since then. Annual reports for the years through 1963 have been published in quarterly progress reports printed by the Minnesota Division of Game and Fish.

1.88

University of Minnesota
Minneapolis, Minnesota 55455

SOME ECOLOGICAL IMPLICATIONS OF THE MANAGEMENT OF ITASCA STATE PARK TO MEET RECREATIONAL OBJECTIVES

Henry L. Hansen
Supported by *Forest Service, U.S.D.A.*

Objectives:

1. To define (through investigation of the historical and ecological evidence) the characteristics of the Itasca vegetation in the mid-1800's prior to the commencement of logging, its characteristics at the time of logging cessation (in the early 1900's), and its present characteristics (1960's) under conditions of protection-management.

2. To determine what changes will take place with time in the park forests as a result of ecological succession under the present protection-management policy.

3. To investigate the possibilities of manipulating the vegetation (including the use of controlled fire, tree cutting, tree planting, and herbicides) to recreate the forest cover situation of the mid-1800's.

4. To evaluate (a) preference sand reactions of recreational users of Itasca to proposed manipulations and (b) the administrative problems posed by such manipulations, in an effort to define the desirability and the feasibility of specified management activities.

5. The integration and evaluation of the research data as it pertains to management recommendations (including zoning, control burning, cutting, planting, berbicide application, and others) which could be implemented at Itasca or at other similar "wildland" recreational areas.

1.89

University of Minnesota
Minneapolis, Minnesota 55455

A STUDY OF UNDERGRADUATE AND GRADUATE CURRICULUMS IN RECREATION AND PARK ADMINISTRATION IN COLLEGES AND UNIVERSITIES IN THE UNITED STATES

Jackson M. Anderson
Supported by *American Association for Health, Physical Education, and Recreation*

The study will attempt to determine: the types of degrees being granted by colleges and universities preparing recreation and park personnel; the number of faculty members involved in preparing recreation and park personnel, and the degrees held by these persons; the number of recreation and park personnel graduating from each college or university, and the number receiving the bachelor's degree, the master's degree and the doctorate; the particular specializations in recreation and park administration given at both the undergraduate and graduate levels; and the name of the chairman or director of the curriculum in recreation and/or park administration. The above information will be gathered through the distribution of a comprehensive questionnaire. The project was begun in, and will be completed in, the fiscal year 1966-67.

1.90

School of Forestry
University of Minnesota
St. Paul, Minnesota 55455

ECOLOGY AND MANAGEMENT OF BOUNDARY WATERS CANOE AREA CAMPSITES

Sidney S. Frissell, Jr.

Supported by *Forest Service, U.S.D.A.*

This project is designed to provide the basic data necessary for the development of a program of wilderness campsite management in the Boundary Waters Canoe Area of the Superior National Forest, Minnesota. The study is divided into five sub-projects to investigate the following:

1. The supply of currently used campsites, their physical characteristics, location with respect to potential campsite areas, and the possibility of shifting use from over-used sites to new sites;
2. The form and severity of changes in the wilderness environment on campsites in areas with different geology, soil type, and vegetative cover;
3. The rate of change which takes place with use;
4. The effectiveness and acceptibility of various techniques for rehabilitating over-used wilderness campsites.

1.91

Mississippi State Game and Fish Commission
Box 386
Cleveland, Mississippi 38732

STATE-WIDE LAKE AND STREAM SURVEY

E. W. Coleman

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To draw up a map showing outline of the lake, depths of water, access areas, location of boat docks and their facilities, nearest town, highway, etc., with water source and type of watershed.

Procedure: Base maps will be drawn from aerial photographs where maps are not available. Depths of the water will be determined by the use of a recording echo sounder operated on transects at regular intervals. Facilities available and access areas will be determined by project personnel during the process of carrying out the other jobs outlined. Inlets, outlets, and type of watershed and type of pollution, if any, will also be determined in this manner. All data will be recorded on standard forms.

The major portion of the time will be spent in preparing the final report and updating facilities on the lakes.

1.92

Mississippi State University
State College, Mississippi 39762

AN INVENTORY AND STUDY OF BEAVER IMPOUNDED WATER IN MISSISSIPPI

Dale H. Arner

Supported by *Office of Water Resources Research, U.S.D.I.*

(1) To determine the nature and extent of beaver impoundments in Mississippi.

(2) To study the effects of beaver impoundments on local water tables and timberland.

(3) To study the ecological effects of beaver dams on fish and wood duck production.

(4) To determine the suitability of beaver impoundments of growing choice waterfowl foods and the possibility for receiving a satisfactory monetary return from such developments for recreational use.

(5) To develop recommendations as to how beaver and beaver impoundments could be managed for the best utilization and conservation of water resources of Mississippi.

1.93

Mississippi State University
Agricultural Experiment Station
State College, Mississippi 39762

ESTABLISHMENT AND MANAGEMENT OF SOUTHERN TURF GRASSES

Louis N. Wise

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Evaluate a wide variety of turfgrasses with reference to their use on home and industrial lawns, golf courses, athletic fields, parks, highways, and other turfed areas; develop and evaluate turfgrass establishment and management methods and practices.

Description of Work:

An area of 1.7 acres was established to various turfgrasses. This area is divided into three tests. In one test eight strains of St. Augustine, twenty-four strains of Zoysia and forty-eight strains of Bermudagrass were sprigged and are being evaluated as to rate of spread, disease resistance, cold resistance, drought resistance and appearance. In the second test area, four sources of nitrogen applied at five intervals and three rates on Tiftgreen Bermuda under gold green management are being studied. The treatments are applied in a 4x5x3 factorial arrangement in randomized complete block design using three replications. In the third test area, a study is being made to determine the effect of rates of nitrogen fertilization, source of nitrogen and height of cutting on thirteen turfgrasses. The grasses in all three tests are rated visually once a week.

1.94

Montana Fish and Game Department
Box 151A
Bozeman, Montana 59715

EVALUATION OF RIVER FISH POPULATIONS

John J. Gaffney

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The purposes of this job are to develop shocking gear and techniques for sampling fish populations of large rivers and to compile data that reflect the status of river trout populations.

The objectives of the project will be as follows:

1. Conventional shocking gear is ineffective in taking fish from some larger rivers. Modifications will be made in existing gear in an attempt to increase effectiveness under river conditions. Dual or multiple electrode systems and modified electric seines will be investigated.

2. Determine by statistical methods, minimum length of sections and minimum number of fish needed for estimating the size and condition of river populations.

3. On those streams where adequate samples can be obtained, the following determinations will be made: estimates of total population, species composition, growth rates, age and size composition, recruitment and population turnover. Mark-and-recapture studies will be utilized to estimate total numbers. Catch per unit of effort may have some application where estimates of total numbers cannot be made.

4. Periodic creel census will be conducted to determine fishing pressure and angler harvest. Estimates of angler harvest will provide a means of differentiating between angler mortality and other forms of mortality.

5. Determine the extent of fish movement within a river system and the influence of such movement on recreational fishing. Movement would be determined by tagging, marking or the use of telemetric devices.

Preliminary sampling has been most successful on the Madison and East Gallatin Rivers. Therefore, efforts will be concentrated on these 2 streams during the first year. As time permits, sampling will be conducted on other streams.

1.95

Montana Fish and Game Department
Great Falls, Montana 59401

EVALUATION OF THE EFFECTS OF HIGHWAY CONSTRUCTION ON THE FISH HABITAT OF LITTLE PRICKLY PEAR CREEK

Nels A. Thoreson

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The purpose of this investigation is to determine the extent of physical habitat destruction caused by construction of Interstate Highway 15 along Prickly Pear Creek and obtain information concerning its effect on the fish and aquatic insect populations. The physical characteristics of the stream bed will be measured and listed according to the specifications described in Montana's stream survey instructions. This description will be made before and after construction.

The fish population will be sampled at six stations which were established in 1949 and repeated in 1961, 1962, 1963 and 1964. Bottom fauna samples were taken in 1961, 1962, 1963 and 1964 and will be continued.

Location: Little Prickly Pear Creek, Lewis and Clark County

1.96

Montana Fish and Game Department
Southwest Great Falls, Montana 59401

INVENTORY OF WATERS OF THE PROJECT AREA (NORTH CENTRAL MONTANA)

R. L. Johnson

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The objectives of this job are to determine the physical, chemical and biological characteristics of the waters of value to the fishery of the project area, and to estimate the fishing use of these waters.

The inventory will cover these waters deemed important to, or contributing to, the fishery of the project area. The waters surveyed will include some that now receive or may receive liberations of hatchery fish, waters that have special management procedures in effect, or where special management procedures may be desirable.

Information will be obtained from maps, aerial photographs, the U.S. Forest Service and other agencies, and from field investigations.

The completeness of any survey will depend upon time available and the characteristics of the body of water. The usual survey will include the information below:

1. Widths, lengths, volume flows, velocities, and depths for streams; depths and areas will be determined for lakes. This information will be obtained from field observations, from maps and aerial photographs, and from data obtained from other agencies.
2. Drainage, shoreline, bottom, and other physical characteristics will be recorded from field observations.
3. Temperature data will be obtained by project personnel or from other Department personnel.
4. Gross chemical data will be collected where desirable and feasible.
5. Natural reproduction and reproductive potentials of waters will be determined by field observations.
6. Determination of fish species present, their abundance, and age and growth data will be collected.
7. Existing and/or potential fisherman use will be determined by direct or indirect observations.
8. Access to a particular water will be determined from maps, landowners, other agencies and field observations.

1.97

Montana Fish and Game Department
Great Falls, Montana 59401

EVALUATION OF THE EFFECTS OF HIGHWAY CONSTRUCTION ON THE FISH HABITAT OF LITTLE PRICKLY PEAR CREEK

Richard L. Johnson

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The purpose of this investigation is to determine the extent of physical habitat destruction caused by construction of Interstate Highway 15 along Prickly Pear Creek and obtain information concerning its effect on fish. The U.S. Geological Survey will continue their sediment study.

The fish population will be sampled at six stations which were established in 1949 and repeated in 1961–1965.

1.98

Montana Fish and Game Department
Kalispell, Montana 59901

INVENTORY OF WATER OF THE PROJECT AREA

D. A. Hanzel

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

It is *the objective* of this job to determine the physical, chemical and biological characteristics of waters of highest importance to the total recreational picture of the project area. Initial surveys will be conducted on the more accessible lakes in the district. Follow-up surveys will be conducted on lakes where additional information is desired. Through this information we can make basic management recommendations for a continuing fishery. To a large extent these waters of importance are waters that are planted by the department or waters that are anticipated for future plants. The completeness of the survey work will depend on the need and the work planned for this particular area. The emphasis of this year's survey work will be given to the waters of the upper Swan and Salmon River drainages. In addition, water quality information will be collected from the high alkaline lakes in the Eureka area.

1.99

Montana Fish and Game Department
Box 187
Miles City, Montana 59301

INVENTORY OF WATERS OF THE PROJECT AREA

Donald R. Bianchi

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The purpose of the project is to determine the physical, chemical, and biological characteristics of the waters of importance to recreational fishing in the project area.

To a large extent the waters inventoried will be stock water ponds for which requests for hatchery fish have been made. In addition to artificially impounded waters, rivers in the area (Tongue River, Yellowstone River) will be inventoried when possible to determine what potential they have for sport fishing. The completeness of a survey on any body of water will be regulated by the characteristics of the particular water and its importance to the overall fishery of the area.

The usual procedure on impounded waters will be to determine the depth, approximate area, type of drainage area, fish species present and chemical characteristics if they are thought to be determined. Ponds that have been stocked in previous years will be sampled with gill nets and seines to determine the results of previous management procedures. Rivers will be sampled with gill nets, seines and shocking gear to determine species composition. Creel checks will be made whenever possible. The period of collection of data will be summer and fall of 1966. Data analysis and reporting will be late winter of 1967. This project is scheduled to continue for three years.

1.100

Montana Fish and Game Department
Missoula, Montana 59801

INVENTORY OF WATERS OF THE PROJECT AREA (Western Montana)

Liter Spence

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The objectives of this job are to determine the physical, chemical and biological characteristics of the waters of value to the fishery of the project area, and to estimate the fishing use of these waters.

The inventory will cover those waters deemed important to, or contributing to, the fishery of the project area. The waters surveyed will include some that now receive or may receive liberations of hatchery fish, waters that have special management procedures in effect, or where special management procedures may be desirable.

Information will be obtained from maps, aerial photographs, the U.S. Forest Service and other agencies, and from field investigations.

The completeness of any survey will depend upon time available and the characteristics of the body of water. The usual survey will include the information below:
1. Widths, lengths, volume flows, velocities, and depths for streams; depths and areas will be determined for lakes. This information will be obtained from field observations, from maps and aerial photographs, and from data obtained from other agencies.
2. Drainage, shoreline, bottom, and other physical characteristics will be recorded from field observations.
3. Temperature data will be obtained by project personnel or from other Department personnel.
4. *Gross chemical data will be collected where desirable and feasible.*
5. Natural reproduction and reproductive potentials of waters will be determined by field observations.
6. Determination of fish species present, their abundance, and age and growth data will be collected.
7. Existing and/or potential fisherman use will be determined by direct or indirect observations.
8. Access to a particular water will be determined from maps, landowners, other agencies, and field observations.

1.101

University of Montana
Missoula, Montana 59801

BIOLOGICAL SURVEY OF WILD RIVERS

John J. Craighead

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

This project is a supporting study for "Wild River Evaluation and Classification" and will supply basic data important in the overall appraisal of these streams.

1.102

University of Montana
Missoula, Montana 59801

WILD RIVER EVALUATION AND CLASSIFICATION

John J. Craighead

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

A national recreational classification for rivers and streams will be established and a standard recreational rating system will be developed.

1.103

National Recreation and Park Association
8 West Eighth Street
New York, N.Y. 10011

INTERNATIONAL SURVEY OF MOBILE RECREATION FACILITIES

S. H. Friesurgh

Supported by *National Recreation and Park Association*

A questionnaire survey of recreation and park agencies in the United States and abroad, to ascertain the extent to which mobile recreation facilities (bandwagons, shells, portable stages, artmobiles, bookmobiles, mobile pools and rinks, zoomobiles, showboats, etc.) are being operated. Information is being sought on their ownership, cost of construction and operation, design and construction features, contents, operating personnel, insurance and traffic regulations and other official requirements, scheduling and publicizing, and advantages and limitations of the units.

Publication of an illustrated manual based on the information gathered is planned.

1.104

National Recreation and Park Association
8 West Eighth Street
New York, N.Y. 10011

1965 RECREATION AND PARK YEARBOOK

Muriel F. McGann

Supported by *National Recreation and Park Association*

An inventory of municipal and county parks and acreage; personnel employed for park and/or recreation service; and capital and current operating expenditures for recreation and parks in 1965 of the fiscal year ending in 1965, by municipalities and counties in the United States. The Yearbook is compiled every five years, and a particular effort is being made to secure reports from municipalities and counties that reported in 1960, so that growth can be ascertained.

Information will be secured by questionnaire, supplemented by correspondence and telephone. The survey began and will be completed in 1966. Publication is scheduled for late 1966 or early 1967.

1.105

National Recreation and Park Association
8 West Eighth Street
New York, N.Y. 10011

A PUBLIC HEALTH SERVICE SHORT-TERM TRAINING COURSE DESIGNED TO UPDATE RECREATION KNOWLEDGE AND SKILLS FOR PROFESSIONAL (AND SUB-PROFESSIONAL) HEALTH PERSONNEL WORKING WITH THE SEVERELY AND PROFOUNDLY RETARDED.

Morton Thompson
Supported by *Public Health Service, HEW*

There is increasing evidence that recreation can make a worthwhile contribution to the physical, social and emotional development of severely and profoundly retarded. Unfortunately, there is little resource information on recreation techniques and methodology to help the increasing numbers of recreation professionals, and sub-professionals, teachers, parents and volunteers who are now involved in programs for these retarded.

The National Recreation and Park Association with the cooperation of a number of interested agencies and leaders in this field proposes a course of training for the Mid-Atlantic and New England States on recreation for the severely and profoundly retarded. The course to be held at Vineland, New Jersey, will be geared to specific information and practice of skills for persons directly concerned in recreation for the severely and profoundly retarded.

An outstanding group of faculty members have been gathered together to provide the leadership. The proceedings are to be mimeographed and distributed to the participants as well as to other interested persons.

It is hoped that the training course will motivate others of this type across the country.

1.106

National Rifle Association of America
1600 Rhode Island Avenue, N.W.
Washington, D.C. 20036

NRA SAFETY RANGE PROJECT

Ben C. Curtis
Supported by *National Rifle Association of America*

The National Rifle Association is conducting research in the construction of a small arms range, of 20 firing points, with targets at 25 yards, 25 meters, 50 yards, 50 meters and 100 yards with an adjacent shotgun area.

Purpose is to develop construction techniques, which will completely contain the bullets within the range area proper, and reduce the escaping sound to the lowest possible level. This will make possible the construction and use of "Safety Ranges," for competition and recreational firing, in parks, recreational areas and heavily populated communities.

Continuous experiments will be conducted in the field of safety, sound suppression/and mechanization.

The project is located near the town of Cheltenham, in Prince Georges County, Maryland.

1.107

Nevada Fish and Game Commission
Box 678
Reno, Nevada 89504

WHEELER DISTRICT FISHERIES MANAGEMENT INVESTIGATIONS

Dale Lockhard
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

An intensive creel census study is in progress on a State-owned warm water fishery to determine total use and harvest data. Random census is collected from various other district waters for collection of needed biological information.

Fingerling trout plants into various district reservoirs will continue in order to determine their success and value or needed changes in these introductions. Experimentation will continue on various new and modified types of fish tags.

A life history study of the largemouth bass is continuing on a shallow reservoir which harbors only this single species. Due to the shallow and fertile basin, the production and growth compare with waters in the warmer southern climates.

Continued effort will be placed upon the preservation of our fishable waters, public and private, threatened by pipelines, ditching, erosion, pollution and closure.

Four fisheries are being re-developed following chemical treatment to remove trash fish problems. They include warm and cold water fisheries, and a combination trout-bass fishery.

Another stream was treated prior to impoundment of a new reservoir which will be developed and managed as a trout resource.

An *Angler's Guide to Eastern Nevada* is in preparation. Also, a final report for publication, "Total Angler Use and Economic Value of a Small Reservoir in Semi-Arid Southeastern Nevada" is near completion.

A reservoir site is presently being investigated which, if developed, will result in a recreational resource where very little has been available.

1.108

Nevada Fish and Game Commission
Box 678
Reno, Nevada 89504

ACCESS AND RESERVOIR SITE INVESTIGATIONS

Robert C. Sumner

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

As Nevada's human population expands, the problem of maintaining access to suitable fishing waters becomes increasingly difficult. Private lands adjoin portions of fishing streams, lakes and reservoirs. Access through these private holdings is often restricted or prevented. In the areas where such problems exist, a means to permit public access will be attempted.

A number of good reservoir sites have already been selected on several streams in Nevada. Additionally, public agencies and private individuals contemplated construction of other reservoirs. Much of the future sport fisheries in Nevada can be expected to exist in such waters. The development of these types of environment for sport fishing is the goal of project personnel.

Procedures:

To assist in developing access to fishing waters, project personnel will contact property owners and attempt to secure public access, either through agreement, lease, easement, or purchase. Where access through public lands are involved, personnel will work with the controlling agency in developing means of access to fishable waters.

The search for additional reservoir sites will continue. Project personnel will conduct initial surveys for establishing feasibility data and drafting preliminary plans with which to contact land owners or water users. Measurement of stream flows will be conducted. As funds are available, project personnel will be called on for assistance in the engineering survey work. Where public or private reservoirs are contemplated, project personnel will develop data for maintaining minimum pools and operational procedures which will protect and enhance fisheries which may develop.

1.109

Nevada Fish and Game Commission
Box 678
Reno, Nevada 89504

OWYHEE DISTRICT FISHERIES MANAGEMENT INVESTIGATIONS

William A. Nisbet

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

General objective is to provide adequate recreational fishing with existing fisheries resources, and develop new potentials within the district. Through creel census and marked fish introductions, data will be gathered to determine the best trout stocking practices for optimum angler success, trout growth and survival. Periodic inventories on environmental conditions of streams and lakes within the district will be undertaken to reveal possible limitations (food, pollution, rough fish infestations, temperatures, physical features, etc.), or beneficial factors. Using sampling techniques, fish populations will be determined in various bodies of water in the district. Acquiring water rights, access to and along fishing areas, lands for reservoir sites and lakes or ponds in order to create and maintain suitable areas for fishing purposes within the Owyhee District is also stressed. Additional suitable sites in which to introduce either warm or cold water fish will be sought, and such initial introductions will be carried out.

1.110

New Mexico Department of Game and Fish
State Capitol
Santa Fe, New Mexico 87501

ANTELOPE POPULATION TREND ESTIMATES AND HARVEST INFORMATION

James Johnson

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objectives: To formulate annual harvest regulations for antelope.

Segment Objectives: 1. To obtain antelope population estimates. 2. To contact landowners for the purpose of initiating agreements for harvesting antelope on private lands. 3. To compile antelope harvest information.

Procedures: 1. Aerial surveys will be conducted on antelope flight units (see attached map) throughout the State to obtain data on antelope populations for the purpose of determining the number of harvestable animals. Surveys conducted on all units will be 33-percent sample surveys except where rugged terrain or where small size areas are more feasible to survey 100 percent. Surveys will be conducted between June 1 and July 15 each year. Antelope flight units will be flown on a rotational basis every third year unless a need is demonstrated for consecutive surveys in some areas. After July 15, each year a fawn check will be made by aerial survey in each quadrant of the State to determine yearly production.

Survey strips for aerial surveys will be flown 100 feet above ground level for total counts and 200 feet above ground level for the one-third sample surveys. The observational area of each survey strip will be one-quarter mile on each side of the flight line for total counts and one-half mile to the west for one-third sample surveys. Flight patterns will be flown north and south to avoid sunglare. Survey strips will be at one and one-half mile intervals for the one-third sample surveys and at one-half mile intervals for the 100-percent surveys. The surveys will be flown along prescribed routes in designated antelope herd units. Information on antelope observed will be recorded directly on antelope herd unit maps. Information to be recorded is the location, sex, and age classification of animals observed. Large maps of each flight unit shown on the attached flight unit map are available in the Santa Fe office, for use on aerial surveys.

2. Following the aerial surveys, some landowners will be contacted for the purpose of establishing agreements to harvest antelope on private lands. Results of the surveys will be discussed and the number of antelope permits to be issued will be determined for each ranch. This will be accomplished by both project personnel and district officers. District officer time on this activity will not be charged to the project.

3. Antelope harvest information will be collected at project-operated checking stations. Project personnel will supervise the collecting of harvest data. Information on location of kill and sex and age composition of the kill will be recorded on hunter check forms supplied by the project. Hunt information will be compiled and used to evaluate results of management recommendations based on aerial surveys.

1.111

New Mexico Department of Game and Fish
State Capitol
Santa Fe, New Mexico 87501

PRAIRIE CHICKEN HUNTING HARVEST FIELD SURVEYS

Howard Campbell

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective:
To determine the life-span, movements, mortality rates (including hunting), and the age and sex ratio constants of the lesser prairie chicken in New Mexico to aid in preparation of recommendations for harvest regulations.

Segment Objective:
To obtain data on prairie chicken hunting and hunter harvest.

Procedures:
Two check points will be established in conjunction with conservation officer roadblocks on State Road 18 in the prairie chicken range of Southeastern New Mexico. One check point will be in Roosevelt County near Dora, and the other will be in Lea County north of Tatum. At the check points, age and sex data will be collected on prairie chickens bagged by hunters, using the shape and coloration of Primaries IX and X for classifying the birds as to young-of-the-year or adult, and the coloration of the tail to separate the sexes. Information will also be collected as to hunter success, hunter pressure, concentration areas of kill, number of prairie chickens seen, crippling loss, behavior of the birds, weather conditions and miscellaneous hunter comments.

Prairie chicken hunter-harvest data obtained during field checks by conservation officers and other Department of Game and Fish personnel will be summarized and compared with corresponding data obtained at the above-mentioned check stations.

Work Schedule:
Field work: During prairie chicken hunting season, usually three days in November or December.
Analysis and report preparation: As soon as possible after prairie chicken hunting season closes.

Location of Work:
Prairie chicken hunting area, generally including all

of Roosevelt County, and parts of Lea, Curry, De Baca, Chaves, and Eddy Counties.

1.112

New Mexico Department of Game and Fish
State Capitol
Santa Fe, New Mexico 87501

WEATHER AND CLIMATE OF SCALED QUAIL STUDY AREAS

Howard Campbell

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective: To determine the effects on local scaled quail populations of (a) hunting pressure and harvest, and (b) annual variations in local climate, chiefly precipitation.
Segment Objective: To collect data on the weather and climate of the two Madera quail study areas for use in interpreting the information on quail populations gathered under W.P. 1, Job 5, and the vegetation data collected in W.P. 1, Job 3.

Procedures: Precipitation and its seasonal distribution are assumed to be the climatic factors most likely to have important influences on scaled quail populations in the parts of New Mexico within the normal, non-marginal portions of the range of the species, such as on the Madera study areas. In accordance with this working assumption, three rain gauges were installed early in the investigation on each of the two study areas. These gauges are located at widely separated points on each study area in order to secure estimates of average precipitation over the entire areas. The gauges will continue to be read periodically throughout the year in order to obtain a nearly complete record of the precipitation on each study area. Gauges will be read at no greater than weekly intervals. Experience has shown that significant errors due to evaporation losses between readings do not occur if the intervals do not exceed one week, even in hot weather. Often, of course, it will be possible to read the gauges oftener than at weekly intervals.

A record of snowfall will also be maintained, including approximate moisture content, depth, and length of times snow covers the ground.

A standard self-recording maximum-minimum thermometer is installed on each study area. The instruments are read several times per month (usually at weekly intervals) in order to obtain a record of the highest and lowest temperatures prevailing on the study areas.

The weather data compiled in this job will be studied in connection with the quail population and vegetation data secured in Jobs 5 and 3, respectively, of this work plan in order to determine correlations which may exist.

Location of Work: Madera quail study areas, Lea County, New Mexico.

1.113

New Mexico Museum
Santa Fe, New Mexico 87501

ARCHEOLOGICAL INVENTORY

R. K. Alexander

Supported by *New Mexico State Highway Commission and U.S. Bureau of Public Roads*

To provide an inventory of archeological and historical remains within approximately 1,000 Ft on either side of the Federal-Aid interstate, primary, and selected secondary roads in New Mexico. The inventory will locate the sites, record their physical extent, and provide an estimate of the required man-days and equipment needed for their efficient salvage, should this become necessary because of highway relocation or realignment. Upon completion of the study, the museum will prepare a complete report of the findings, consisting of detailed maps of the areas inventoried with the sites located thereon, accompanying text supplying the data on each site as recorded, and evaluation of the data by region.

1.114

New Mexico State University
University Park, New Mexico 88070

ROADSIDE DEVELOPMENT

F. Bromilow

Supported by *New Mexico State Highway Commission and U.S. Bureau of Public Roads*

Plants adaptable to an arid climate will be found for use on roadside shoulders and channels, to reduce wind and water erosion. Methods of establishing and caring for plants were an essential phase of the project. Observations of abandoned or undisturbed road shoulders indicated that grasses became established in the normal order of succession of plants, usually after several years. The methods used for establishing grasses attempted to short circuit the normal succession route, including asphalt emulsion applied directly to the planted soil, a plastic resin applied directly to the soil and the same products used as a binder to hold barley straw in place over the planted soil. Ninety-six varieties of native trees and shrubs were tested for landscape use as well as safety markers for culverts, curves, etc.

1.115

New Mexico State University
University Park, New Mexico 88070

RECREATIONAL VALUES OF WATER IN THE MAJOR RESERVOIRS OF NEW MEXICO

James R. Gray
Supported by *State of New Mexico*

Objectives:

1. To determine recreational demand schedules and demand price elasticities at Elephant Butte and Navajo reservoirs.
2. To measure the changes in demand schedules for the major recreational activities as reservoir levels change from one season to subsequent seasons.

Description of work proposed:

Personal interviews will be made to determine characteristics and expenditures of recreationists primarily engaged in boating, fishing and a combination of picnicking, camping and cabin living at Elephant Butte and Navajo reservoirs. When the reservoir levels change substantially from the period of the first set of interviews, a second set of interviews will be conducted. The analyses will consist of construction of demand schedules based on variable recreation costs, computation of demand price elasticities, and estimation of net values of water in the reservoirs based on changes in the two sets of demand schedules using a single equation model.

1.116

University of New Mexico
Albuquerque, New Mexico 87106

WILDERNESS AREA CLASSIFICATION AND PROBLEMS OF PRIVATE USE AND LAND OWNERSHIP WITHIN WILDERNESS AREAS

Richard E. Murphy
Supported by *University of New Mexico*

This research project has grown out of the investigator's work on wilderness areas, including an M.A. thesis on *Wilderness Areas of the United States,* George Washington University, 1952, and a doctoral dissertation on *The Problem of Land Ownership in the Wilderness Areas of the U.S. National Forests,* Clark University, 1957. This material is being up-dated and enlarged to include mining and grazing problems. The intention is to relate the problems of use and land ownership to wilderness area definition, and to map areas of relative wilderness attributes with particular emphasis on the wilderness and primitive areas designated as such in the National Forests of the United States. While the bases for the present project were laid in the work dating back to 1952, the revision, synthesis, and additions were started only this year, and an initial presentation in the form of an article for submission to one of the scholarly journals is planned for 1968.

1.117

NYS Water Resources Commission
Conservation Department
State Campus—Albany, New York 12226

REGIONAL COMPREHENSIVE MULTI-PURPOSE WATER RESOURCES PLANNING STUDIES

F. W. Montanari
Supported by *State of New York*

Each study involves an inventory of the water resources, quantity and quality, of the basis under investigation; an assessment of present needs (including recreation, irrigation, public water supply, low flow augmentation, fish and wildlife, power, navigation, etc.) in terms of water resources development; and a projection of future needs and identification of means and preparation of plans for meeting them. An economic base study is made to determine the present economic make-up in the area and to make the necessary projections of population growth, industrial change, etc.

Hydrologic and economic information are obtained from analysis of existing data and intensive data collection using field observations, interviews, and mail questionnaires.

At present, regional studies under three water resources planning and development boards are underway. The Erie-Niagara Basin investigation under one board was begun in 1963 and will be completed in 1968. The Upper Seneca River portion of the Oswego River Basin is being studied under two boards. This study was initiated in 1964 and will end in 1970. It is anticipated that during fiscal year 1966–67, studies in several other regions will be started. These include the remainder of the Oswego Basin, the Upper Mohawk Basin, the Susquehanna Basin, the Black River Basin, and the Cattaraugus-Chautauqua area.

A non-salaried seven-man Board, composed of local leasers, appointed by the Water Resources Commission, is responsible for the conduct of the study and for evolving comprehensive plans for development in each region. Office space, equipment, technical, legal, engineering, clerical and other personnel and services are provided by the Water Resources Commission. The Commission is composed of the heads of seven State departments—Conservation (Chairman), Agriculture and Markets, Commerce, Health, Law, Public Works, and Office for Local Government.

1.118

State University of New York at Syracuse
College of Forestry
Syracuse, New York 13210

ADMINISTRATION OF OUTDOOR RECREATION IN NEW YORK STATE GOVERNMENT

P. Graves
Supported by *State University of New York at Syracuse*

Objective: To identify the agencies involved in outdoor recreation at the State level, to identify and describe the nature and scope of current programs and the areas of responsibility of various State agencies, for the purpose of providing local governments and individuals with information needed to pursue inquiries pertaining to outdoor recreation plans and developments.

Progress of Principal Research Accomplishments during 1965: Local government officials were interviewed to determine scope of problems and interests involving outdoor recreation, State agencies and programs summarized, chart showing inter-relationship of various State agencies concerning outdoor recreation was prepared and submitted to several State agencies for review.

Work planned for 1966 Calendar Year: Completion of work and preparation of a report.

1.119

State University of New York at Syracuse
College of Forestry
Syracuse, New York 13210

PROBLEM ANALYSIS IN OUTDOOR RECREATION

P. Graves
Supported by *State University of New York at Syracuse*

Objective: To identify the status of outdoor recreation research in New York, to expose areas of duplication, and to clarify primary research needs.

Progress of Principal Research Accomplishments during 1965: Questionnaire concerning research in progress and research needs was circulated to leaders of about 100 park and recreation organizations, to public officials or administrators of park and recreation programs, and faculty personnel of selected State University units. Interviews were completed with several public officials and others concerning research needs in outdoor recreation. Literature relative to outdoor recreation programs in New York was reviewed.

Work planned for 1966 Calendar Year: Completion of supporting data and preparation of a report.

1.120

North Carolina Wildlife Resources Commission
Box 2919
Raleigh, North Carolina 27602

EVALUATION OF SPORT FISHERY FOR AMERICAN SHAD IN THE CAPE FEAR RIVER BASIN

James R. Davis
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The objectives of this study were to estimate the recreation potential of the anadromous shad runs to sport fishing and to establish the degree of exploitation of the spawning population generated by the sport fishery.

Activity under this job during Fiscal Year 1967 will be restricted to the preparation of a final report.

1.121

North Carolina Wildlife Resources Commission
Box 2919
Raleigh, North Carolina 27602

ANALYSIS OF ENVIRONMENTAL CHANGES, WATERFOWL USAGE, HUNTER PRESSURE AND FEASIBILITY OF SALT MARSH

Otto Florschutz
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective:
To determine the value of impounded salt marshes for waterfowl, hunters, and food plants. To determine the practicability of this type of impoundment for refuge and public hunting areas in coastal North Carolina.

Procedure:
1. Periodic examinations of the environmental changes in the Gull Rock, Goose Creek, White Oak and Pamlico Point impoundments will be made.
2. Data on water level changes, muskrat dike damage evaluations, salinity concentrations, rainfall, and waterfowl populations will be collected and analyzed.
3. Waterfowl hunter bag data will be collected and analyzed. Also multi-uses will be evaluated, i.e., fishing, trapping, mosquito control, etc.
4. Duck-day usage and hunter-success will be correlated with the data collected on the above.

Location of Work: Northwest River Marsh, Gull Rock, Goose Creek, Pamlico Point, and White Oak River impoundments.

1.122

North Carolina Wildlife Resources Commission
Box 2919
Raleigh, North Carolina 27602

CATALOG OF INLAND FISHING WATERS

Frederic F. Fish

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The objective of this job is to prepare the final manuscript for, and to publish, a "Catalog of Inland Waters" that will carry, in progressive upstream sequence, an indexed summary of all available information on every inland fishing water of significance within the State. The information summarized will include the ecological and sanitary classifications, physical dimensions, points of access, percentage of catch composition, indicated catch rate, and general informational remarks related to fishing.

Each of the 7,545 individual inland fishing waters, as they have been listed in the field, will be rechecked for completeness and accuracy and appropriately coded. The name of each stream, together with its identifying code number, will be transferred to punch cards for alphabetical listing by electronic data processing for the Catalog index.

Each of the 1,947 work sheets for waters of fishing significance submitted from field investigators will be rechecked for accuracy, edited, and the appropriate coding, catch rates, and catch composition.

Finally, the indexed catalog will be typed for multilith processing and binding. This publication will, in essence, consolidate the available data contained in the separate Watershed Baseline Reports already completed under this project, with those from other sources into the only available single reference to fill the many informational needs of State and Federal water-use agencies, educational institutions, and the State's anglers.

This work will be completed in the Raleigh Office of the Wildlife Resources Commission.

1.123

University of North Carolina
Chapel Hill, North Carolina 27514

A STUDY OF THE ECOLOGY OF SAND DUNES IN RELATION TO THEIR STABILIZATION

W. W. Woodhouse

Supported by *National Park Service, U.S.D.I.*

To determine best strains of American beach grass to use on oceanside sand dunes to render them effective as protective barriers against damaging effects of ocean storms. Factors involved are selection and effective use of proper types of fertilizers, techniques of seeding and care during germination and sprouting in the processes of the grasses becoming established. The role of subaerial dune growth and destruction by wind, rain, etc., and the effects of natural and artificial compaction, porosity, and other factors are considered.

Research being conducted in Cape Hatteras National Seashore.

1.124

North Central Forest Experiment Station
St. Paul, Minnesota 55101

SOCIAL AND ECOLOGICAL PROBLEMS OF NORTHWOODS WILDERNESS-TYPE RECREATION

James T. Morgan, Acting

Supported by *U.S.D.A., Forest Service*

Object: To find ways to improve the planning and management of recreational use of wilderness and related forest lands, by better understanding the nature of the resources involved and the different demands for their use. To develop methodology for recreational research.

Plan of Work: Investigation will be concerned with management and recreation use of the Northwoods forest types with particular emphasis on the Boundary Waters Canoe Area (BWCA) in Minnesota. Planned studies will deal with: (1) basic and applied ecological research to identify present and past biotic associations; (2) methods for maintaining and rehabilitating wilderness campgrounds; (3) recreational demand for different activities and for different portions of the total area involved (this will go into characteristics, knowledge, place of residence of actual and potential visitors, and use projections); (4) the local and regional economic impact of alternative management policies in wilderness reservations; (5) recreation attractions and use of areas peripheral to the BWCA that effect the demand in that area; and (6) impact of heavy recreational use on the water quality in lakes and streams.

1.125

North Dakota State Outdoor Recreation Agency
State Capitol
Bismarck, No. Dakota

STATE COMPREHENSIVE OUTDOOR RECREATION PLAN

James M. Lyons

Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

The State Comprehensive Outdoor Recreation Plan is to be based on a series of background papers being prepared by committees of a recreation task force. They include sections defining the purpose, objectives, methodology, data collection, analysis and evaluation on the following topics with emphasis on their impact on recreation development. 1-The Setting-with emphasis on significant region-wide recreation. 2-The State's Physical Resources. 3-The Population, demographic characteristics of the population. 4-The Economy, economic activity of the State by industrial sectors. 5-Land Use and ownership. 6-Participation and Preference for Outdoor Recreation—determination of expressed needs and actual participation in outdoor recreation in outdoor recreation activities. 7-Present Recreation Opportunities—an inventory of existing effective supply of outdoor recreation by activities, areas and quality. 8-Standards—the person/acre capacity by activities and seasonal days of recreational opportunities. 9-Needs—population groups x demand —effective supply x seasonal days x standards = needs. 10-Responsibilities for Recreation development by levels of government and private sector.

11-Recreation goals. 12-1980 Plan for recreation development. 13-Action Program to 1972—a capital improvements program.

1.127

Northeastern Forest Experiment Station
Syracuse, New York 13210

PUBLIC AND PRIVATE FOREST RECREATION MANAGEMENT GUIDES, EASTERN UNITED STATES

Wilbur F. LaPage
Supported by *U.S.D.A., Forest Service*

Object: To evaluate ways of promoting fuller, more efficient use of forest recreation resources with emphasis on compatible coordination of public and private sectors of outdoor recreation.

1.128

Northeastern Forest Experiment Station
Syracuse, New York 13210

RECREATIONAL OPPORTUNITIES OF INCOME PRODUCING FOREST RECREATION ON PRIVATELY-OWNED SMALL WOODLANDS

James Whittaker
Supported by *U.S.D.A., Forest Service*

Object: To explore the problems and opportunities of income producing forest recreation on privately-owned small woodlands.

Plan of Work: Forest recreation resources on small woodlands, and the current and prospective recreation supply and demand, and the costs and benefits will be determined; the costs and benefits, both public and private, appraised for an outdoor recreation enterprise; and effort will be made to overcome obstacles that keep woodland owners from effectively using their forest recreation resources. Effort will be made to learn the needs, wants and motives of individuals using privately-owned forest recreation resources; and to learn how these can best be provided.

1.129

Northern Arizona University
Flagstaff, Arizona 86701

A MODEL OPTION FOR INSTRUCTION IN WILDLAND RECREATION MANAGEMENT AT THE COLLEGE UNDERGRADUATE LEVEL

Richard L. Bury
Supported by *U.S. Office of Education, HEW*

Courses: Syllabi, and suggested readings for instruction in wildland recreation management will be developed. The general design of the study will involve (1) selection and evaluation of course materials, (2) synthesis of a general framework for instruction, and (3) development and evaluation of a model option. These activities will be accomplished by (1) Consulting the managers of recreational areas for recommendations that would be useful in wildland recreation management, (2) Consulting academic and inservice programs of instruction to gain a useful perspective on existing educational materials (3) Synthesizing a general framework of instruction in wildland recreation management and its integration within the multiple-use management concept, and (4) Evaluating the model option with the project consultants during its preparation and upon its completion.

The project is scheduled to start October 1, 1965 and be completed August 31, 1967.

1.130

Ohio Division of Wildlife
1500 Dublin Road
Columbus, Ohio 43212

ANNUAL ANGLER HARVEST FROM SELECTED LAKES

Jack Erickson
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

To determine characteristics of the annual harvest by anglers from selected lakes for a three-year period.

This is to be followed by another study in the future to measure changes.

Procedure:
Harvest data has been collected from Findlay and New Wauseon Reservoir during 1962 and 1963, and for 1962, 1963 and 1964 for Berlin Reservoir and Acton Lake. The data collected from 1962 and 1963 has been keypunched, tabulated and summarized. The information collected in 1964 has been prepared for keypunching. The data compiled will be assembled in tabular form to show periodicity of angling pressure, angler harvest. An effort will be made to estimate total pressure and harvest during the survey period. The influence of pleasure boats will be evaluated on Berlin Reservoir. Scale analysis will be made from scales collected during the various years. The data will be analyzed statistically to determine the confidence limits and variances of selected strata.

1.131

Oklahoma Department of Wildlife Conservation
Oklahoma City, Oklahoma 73124

DYNAMICS OF THE FISH POPULATION IN TENKILLER FERRY

Charles Gasaway
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:
1. (a). To evaluate the contribution of walleye to the sport fishery and (b) To determine fishing pressure, yields, catch and characteristics of the sport fishery (type of fisherman, how they fish, percent of total man-hours of fishing for each class of fish, man time spent fishing, etc.) on Tenkiller Ferry Reservoir.
2. To estimate age composition of the catch, virtual population, and various vital statistics of the fish population (including total fishing and natural mortality rates, production, exploitation, catchability) concerning the more important species of fish in the reservoir.
3. To determine the proportion of tagged or marked fish in the fisherman catch in order to evaluate tagging studies by comparing creel returns with voluntary returns and to make estimates of the fish population and vital statistics of the population.
4. To determine from marking and tagging experiments and from general population sampling, population estimates, as well as other vital statistics, listed above, plus movement and migration patterns, distribution, fish population composition, size frequencies and relative abundance.

Procedures:
Data collected under Segment Number 1 will be complied and analyzed. Creel data will be placed on punch cards for computer analysis. The final report will be prepared during this segment.

1.132
Oklahoma State Highway Department
Oklahoma City, Oklahoma 73124

ROUTE FEASIBILITY—URBAN

Supported by *U. S. Bureau of Public Roads*

The purpose of these studies is to determine the best location of a needed urban facility in terms of economic and other community values. Alternate route location studies include evaluations of possible physical locations. Construction and right-of-way costs, user benefits, consistency with community goals, damage to existing community institutions, and aesthetic qualities. During 1964 a study of alternate locations for proposed U. S. 64 through the Enid area was completed.

1.133
Oregon State University
Corvallis, Oregon 97330

SIMULATION AS A MEANS OF STUDYING RESOURCE ALLOCATIONS

Albert N. Halter
Supported by *State of Oregon*

Objectives:
1. To build mathematical models of the environment and decision-making processes of various resource allocating units (firm, industry, agency, both public and private).
2. To operate and test these models on digital computers.
3. To design and test alternative decision-making criteria and processes.

Progress to Date:
A computer simulation model of a relatively small river basin has been developed that is capable of comparing sizes of reservoirs, channel capacities, water use priorities, operating procedures, and other management policies that come within the economic framework.

1.134
Oregon State University
Corvallis, Oregon 97330

INVESTIGATION OF AQUATIC WEED PROBLEMS AND MEANS OF CONTROL WITH EMPHASIS ON BRAZILIAN WATERWEED

Carl E. Bond
Supported by *State of Oregon*

Objectives:
1. To determine means of controlling Brazilian waterweed and other nuisance aquatic plants.

2. To assess impact of control measures on recreational, industrial, and domestic uses of the bodies of water involved.

Progress To Date:
Preliminary screening tests have been carried out to determine the effectiveness of a number of chemicals against Brazilian waterweed, and secondary tests using some of the more effective have been run at several concentrations. Cultures of aquatic vertebrates are being started.

1.136

Pacific Northwest Forest and Range Experiment Station
Seattle, Washington 98111

WILDLAND RECREATION AND SOCIAL INTERACTION

John C. Hendee
Supported by *U.S.D.A., Forest Service*

Object: In cooperation with University of Washington, Department of Sociology, to (1) determine forest recreation user motivations, preferences, and attitudes, (2) to better understand trends and demand, and (3) to help sharpen visitor information programs, and to obtain better public cooperation in the husbandry of natural resources.

1.138

University of Pennsylvania
Philadelphia, Pennsylvania 19104

DEGRADED HARDWOOD FORESTS

Nicholas Muhlenberg
Supported by *Resources for the Future*

An investigation into the current status and possible future uses of the forested spaces of the eastern megalopolis.

1.139

University of Puerto Rico
Rio Piedras, Puerto Rico 00931

DETERMINATION OF SAFE LEVELS OF POLLUTION IN PUERTO RICO

Antonio Santiago-Vazquez
Supported by *Office of Water Resources Research, U.S.D.I.*

Some Puerto Rico Bays are receiving raw sewage and other organic pollution in high concentrations. Damage has been done to the fish population and to the recreational use of surrounding beaches, the best example being the Bay of Mayaquez just near the Campus of the College of Agriculture and Mechanic Arts where the Institute will have its headquarters.

It is proposed to investigate the degree of contamination of the bay to evaluate the proportional effect of the different factors which contribute directly or indirectly to its actual and future sanitary conditions and its effects on the fish, ecology and the recreational aspect of the bay and surroundings.

This study shall be carried on through the systematic measurement of parameters such as BOD, dissolved oxygen, solids, coliform group, biota, etc. Similarly, physical, chemical, and meteorological factors affecting the locality of the Mayaguez Bay will also be measured.

Efforts will be also made to identify and describe flow patterns near and inside the bay. The goal will be to establish the relationships among the most important of the factors that enter into the problem, with the purpose of establishing criteria for prediction for similar situation in tropical bays.

1.140

Purdue University
Lafayette, Indiana 47907

A STUDY OF SOME EFFECTS OF JUNKYARD SCREENING AND BILLBOARD DENSITY

MacGillivray
Supported by *Indiana State Highway Commission and U. S. Bureau of Public Roads*

Economic effects of, and motorists' reactions to, junkyard screening and billboard concentrations are being examined. A sample of junkyards with varied screening and highways with varied billboard densities will be used. Land values will be studied in each sample area. Motorists' reactions will be considered in films of the view seen while traveling the highway in each sample area.

1.141

Remington Arms, Inc.
Remington Farms,
Chestertown, Md. 21620

CONSTRUCTION AND MANAGEMENT OF SMALL PONDS AND IMPOUNDMENTS FOR WATERFOWL ON FARMLAND; MODIFICATION OF MULTIPLE-PURPOSE FARM PONDS TO INCREASE USE BY WATERFOWL

Clark C. Webster
Supported by *Remington Arms Co., Inc.*

As the number of natural wetland areas diminishes through drainage, the potential for waterfowl use of the accelerating program of farm pond and small impoundment construction merits investigation.

The purpose of this project is to study and apply new or improved methods of construction, design and location on farm lands of small impoundments aimed specifically at waterfowl production and/or wintering, and to investigate possible modifications of multiple-purpose farm ponds which will increase their value to waterfowl without interfering with other uses (e.g. fishing, swimming, stock-watering).

Previously existing or recently created impoundments at Remington Farms totaled 21 in 1964. They range from permanently flooded woodlands and "green-tree reservoirs" to winter-flooded crop fields, small marshes and bare stock-watering ponds. Several new impoundments are planned or under construction.

Year-round observations on the amount and nature of waterfowl use of each pond are carried out and maintained. Intensive studies of waterfowl brood-survival are conducted each summer.

Specific studies underway at present include (1) grain crops best suited for flooded-field plantings; (2) increasing brood survival by encouraging or planting emergent and shoreline vegetative cover, and by furnishing artificial loafing sites; (3) timing and frequency of drawdowns to enhance fertility and food production. Emphasis is placed on simple, inexpensive techniques usable by average landowners. Project started in fiscal 1957 and will continue indefinitely.

1.142

Research Triangle Institute
Research Triangle Park, North Carolina 27709

NORTH CAROLINA OUTDOOR RECREATION PLANNING SYSTEM

James A. Street
Supported by *Bureau of Outdoor Recreation, U.S.D.I. and State of North Carolina*

The Research Triangle Institute's participation in the overall planning process is centered on the design and prototype development of a recreation information planning system that is tied directly to recreation decision-making. The decisions involve investment choices such as those required by the Land and Water Conservation Fund Act. The information framework for the proposed system is the supply and demand for recreation.

Basic supply data will be obtained through a Statewide survey of areas and facilities. Procedures are being developed to determine standards and carrying capacities of these areas. Demand coefficients were determined by the Bureau of Outdoor Recreation, Department of Interior. These coefficients will be applied to North Carolina socio-economic profile with the results to be used to allocate demand for recreation in geographic areas. The interaction of these factors will define the relative need for recreation areas and facilities. Procedures will be developed to systematically revise estimates of need which are the basis for decision-making. The system will probably require projections on a five-year basis with annual data inputs.

1.143

Southeastern Forest Experiment Station
Raleigh, North Carolina 27602

COOPERATIVE FOREST RECREATION RESEARCH UNIT AT NORTH CAROLINA STATE UNIVERSITY

Stephen J. Maddock
Supported by *U.S.D.A., Forest Service*

Object: To promote and guide graduate study and research in the recreational uses of forest and other wild lands. To develop principles and guides to achieve maximum recreation benefits from commercial forests of the Piedmont and coastal plain of the Southeast.

Plan of Work: The project leader will act as advisor for programs of graduate study related to outdoor recreation. Capable students will be recruited from the Forestry School of North Carolina State University and from other departments of nearby universities. Research by graduate students will be in subject matter areas of their choice. Research to be conducted by the project leader will seek to find ways for fuller development of the recreation potential of commercial forests in Piedmont and coastal plain areas. Possibilities for hunting and fishing will be explored. Demand potential and problems associated with picnicking and camping will be investigated. Management practices to maximize recreational uses with minimum disturbance to commercial use will be studied. The importance of recreation to rural communities will be considered.

1.144

University of Rhode Island
Kingston, Rhode Island 02881

AN ANALYSIS OF FACTORS RELEVANT TO THE DEVELOPMENT OF RECREATIONAL RESOURCES

Irving A. Spaulding
Supported by *State of Rhode Island*

Objective: To analyze the social pattern of recreational activity characteristic of the State of Rhode Island and to ascertain the potential use of rural recreational resources.

Work Proposed: Mass recreation and leisure are of recent concern in this Nation's way of life. Many studies of these topics have concentrated on the enumeration of types of recreational activity in which people engage, people's reason for their choice of recreational activities, and time used in recreational activity. The social and psychological implications of some specific recreational activities have been analyzed. Recreation is frequently included as an activity to be given consideration in community organization. Such information contributes appreciably as background for the type of study proposed which entails making an evaluation of potential use of recreational resources.

1.145

Rutgers University
New Brunswick, New Jersey 07505

IDENTIFICATION AND ESTIMATION OF ECONOMIC BENEFITS FROM SCENIC ENHANCEMENT OF NEW JERSEY HIGHWAYS

M. L. Granstrom
Supported by *New Jersey State Highway Department and U. S. Bureau of Public Roads*

The possible economic benefits of the public from scenically enhancing New Jersey highways are being determined.

1.146

Rutgers University
New Brunswick, New Jersey 07505

A STUDY OF THE DEMAND FOR OUTDOOR RECREATION BASED ON THE ANALYSES OF THE NATIONAL RECREATION SURVEYS OF 1960 and 1965

Dr. Paul Davidson
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

The Bureau of Outdoor Recreation initiated a supply inventory for public recreation facilities throughout the United States in a National Recreation Survey for each quarter of 1960; this was followed up by a similar Survey of Outdoor Recreation Participation by the Bureau of Outdoor Recreation in 1965.

The purpose of this project is to analyze the interactions of demand and supply variables which jointly determine participation patterns of different cross section segments of the population for different activities. A theoretical, as well as, an empirical model will be used to test different economic hypotheses for different factors, which determine participation in outdoor recreation.

1.147

Rutgers University
New Brunswick, New Jersey 07505

INDUSTRIAL WATER AND WASTE DISPOSAL REQUIREMENTS IN NEW JERSEY

M. L. Granstrom
Supported by *Office of Water Resources Research, U.S.D.I.*

An exploratory study of procedures for determining industrial water and waste disposal requirements in New Jersey. This will include a projection of future industrial growth and an estimate of water requirements of such industry related to costs of this water. These estimates must take cognizance of great variability in industrial water use, dependent on technology used. Also waste disposal requirements must be estimated in terms of pollutants significant from points of view of recreational use, fish and shellfish conservation, and public health. These requirements also must be related to costs and techniques of treatment which may improve effluents. This study will constitute an integrated approach involving engineering and quantitative economics.

1.148

South Dakota State College of Agriculture and Mechanic Arts
Agriculture Experiment Station
Brookings, South Dakota 57006

THE ESTABLISHMENT OF TREE PLANTINGS TO ENHANCE THE RECREATION POTENTIAL OF SELECTED SITES ON MISSOURI RIVER RESERVOIRS IN SOUTH DAKOTA

Paul E. Collins
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objective:

1. To determine the relationship between selected site factors and the survival and growth of trees in the Missouri River lake areas of South Dakota.

2. To ascertain the effect of certain cultural practices on the growth and survival of newly planted trees in this region.

3. To study the influence of several site preparation methods on the success of tree planting in the Lakes Region.

4. To evaluate the suitability of various species and planting designs in achieving a desirable forest recreational environment.

Procedures:
An intensive survey of tree plantings already established in the Lakes Region will be made. New plantings scheduled for the spring of 1964 by the Corps of Engineers will be studied closely in terms of survival, growth, site preparation, irrigation, and fertilization. Intensive soil moisture studies are planned.

1.149

South Dakota State University
Brookings, South Dakota 57007

INVESTIGATIONS OF THE BIG SIOUX RIVER BASIN AND THE YANKTON-JEFFERSON AREA AND INVESTIGATION OF THE IRRIGATION AND RELATED WATER RESOURCES DEVELOPMENT OF THE EAST DAKOTA CONSERVANCY SUB-DISTRICT

Arthur J. Matson
Supported by *Bureau of Reclamation, U.S.D.I.*

An inventory of surface and ground water resources will be made together with inventories of existing development for irrigation, and municipal and industrial purposes. Possible opportunities for future development of water resources in the Big Sioux Basin are to be outlined. On the basis of projected demand, requirements for future water supplies are to be estimated with possible sources of supply indicated. An economic evaluation of municipal and industrial uses is to be completed. The profitability of present irrigation and of additional irrigation development will be determined. The Yankton-Jefferson portion of the study is to determine if the area could best be developed on an individual farm basis or as a relatively large Bureau type project. Landowner interests in irrigation will be assessed.

The supplement to the study for the Conservancy Sub-District is to appraise the effects on growth and stability of coordinated water resources programs. It also will evaluate irrigation use of water as supplied independently from Federal regulations and procedures. An evaluation will be made of the use of water for several alternative purposes, as pollution abatement, recreation, and regional economic development.

1.150

South Dakota State University
Water Resources Research Institute
Brookings, South Dakota 57007

WATER QUALITY AND PRIMARY PRODUCTION OF SOUTH DAKOTA LAKES

Norman D. Schoenthal
Supported by *Office of Water Resources Research, U.S.D.I.*

Efficient water resource management in South Dakota must consider water quality and productivity as part of its overall program. A knowledge of the water quality is important in recreation development, fisheries management and pollution control. Knowledge of water quality in South Dakota lakes is lacking except in restricted regions. This study will include a systematic water quality evaluation of selected lakes (in various drainages) throughout the state. The physical and chemical parameters will be measured for each of these lakes both during open water and ice cover. The primary production will also be measured during the open water period. From this information qualitative and quantitative relationships between the chemical constituents of the water, climatic conditions, geological associations, morphology and biological production will be determined for the lakes under study.

The information gathered from this study is vital in determining if future land use changes effect the water quality.

Another aspect of the study will determine if it is possible to predict the standing crop and efficiency of fish populations in a body of water by correlating the primary production with the physical and chemical parameters of the environment.

1.151

Southeastern Forest Experiment Station
Asheville, North Carolina 28802

COLLECTION AND APPLICATION OF INFORMATION ON THE USE OF FOREST RECREATION FACILITIES AND RELATED RESOURCES

G. A. James
Supported by *U.S.D.A., Forest Service*

Object: To develop principles and guides to enhance recreational use benefits from forests and other wild lands of the Southeast.

Plan of work: The major phase of work involves recreation information management (RIM) — for measuring outdoor recreation use and processing information on area and site characteristics. Planned work includes the design and testing of a system to compile, store and retrieve facility and use data for all types of forest recreation lands. Other research includes studies aimed at maximizing the use of fish and game resources. This will involve an analysis of the availability and use of access roads and trails. Means of predicting future facility needs will be sought and the effects of regulatory measures on hunting and fishing evaluated. Study of the cold water fishery resource will involve an assessment of its nature, amount and worth in significant areas. The surveys of resources will be complemented by studies of the relationships among availability, fishing pressure, and enjoyment of the sport. Studies dealing with the improvement of the selection, design and management of recreation sites will be sought by: development of criteria for site value, and design and facility layout including manipulation of vegetation, and restoration of problem sites. Measurement of the carrying capacity of sites will be explored, as will the choice of horticultural materials for enhancing and restoring sites.

1.152

Southern Illinois University
Business Research Bureau
911 Forest
Carbondale, Illinois 62901

SOUTHERN ILLINOIS REGIONAL ECONOMIC DATA SYSTEM

Arthur Ely Prell

Supported by *Southern Illinois University*

This project involves the establishment of data banks on important industrial variables. One of the variables to be analyzed, evaluated and catalogued is the water resources of the area as related to business and industry. This would include the industrial requirements for water, the possibilities of developing water resources into recreation industries and the relationship of water as a factor in the development and growth of business and industrial communities.

1.153

Southern Illinois University
Carbondale, Illinois 62901

AN EVALUATION AND COMPARISON OF 1964–65 RECREATION USE AND DEVELOPMENT ON LAKE OF EGYPT AND ITS EFFECT ON WATER QUALITY

Stanley K. Brickler

Supported by *Southern Illinois University*

This research involves an attempt to measure the effect recreation use and development has on the watershed and water quality of Lake of Egypt. The study also is an attempt to establish guidelines for a recreational development program which would minimize major disturbance of the lake's water quality, and enhance the value of the Lake as a highly enjoyable recreation facility.

1.154

Southern Illinois University
Carbondale, Illinois 62901

AN ENVIRONMENTAL APPROACH FOR IDENTIFYING OUTDOOR RECREATION PLANNING REGIONS

Ronald I. Beazley

Supported by *U. S. Forest Service and Southern Illinois University*

Spatial analysis of the variable involved in recreation. One of the major ones of these is the location, size, and depth of lakes, rivers, streams and measurement of their water quality. A second is local rainfall and weather characteristics.

1.155

Stephen F. Austin State College
Nacogdoches, Texas 75961

AVAILABILITY OF PRIVATE LAND FOR PUBLIC HUNTING IN ANGELINA COUNTY, TEXAS

Thomas J. Wood

Supported by *Stephen F. Austin State College*

The problem is to determine availability of privately-owned land in Angelina County, Texas, for public hunting. The scope of the problem includes completely open land, posted and closed land, and land that is posted but open under certain conditions to individuals. Socio-economic aspects are also investigated to determine whether or not these factors influence landowners' policy.

County tax records were used to determine class of ownership. Questionnaires were mailed to large and small individual private landowners. Personal interviews are conducted with responsible officials of forest industries concerning policy on company-owned land.

1.156

Stephen F. Austin State College
Nacogdoches, Texas 75961

RECREATION LAND ACQUISITION POLICIES AND PROGRAMS IN MIDWESTERN METROPOLITAN AREAS

Thomas J. Wood

Supported by *Stephen F. Austin State College*

The problem was to identify recreation land acquisition policies and programs in metropolitan areas to include current trends, methods and problems of park and recreation agencies in metropolitan areas. The scope of the study was limited to fifteen metropolitan areas in five midwestern states, Minnesota, Illinois, Iowa, Nebraska, and Missouri. Specific inquiry was directed to past, current and future recreation land area, population, methods of acquisition, source of revenue, cost of acquisition and basic problems encountered. Data were obtained by mailed questionnaire.

1.157

University of Tennessee
Agricultural Experiment Station
Knoxville, Tennessee 37916

GROWTH OF MIXED SPECIES PLANTATIONS

E. Thor

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives:

1. Determine survival and early growth of pure vs. mixed tree plantings.
2. Determine quality and volume of timber in mixed vs. pure plantations.
3. Determine physical and chemical characteristics of the soil and describe the understory vegetation, both herbaceous and woody.
4. Determine, for mixed vs. pure plantations, food production and cover for wildlife, and screening for recreational activities.

Procedure:

The mixed and pure plantations established in 1940-41 by the Tennessee Valley Authority will be surveyed. Three CFI plots (1/10 A. each) will be used in each of 33 pure and 31 mixed plantations. Soil properties, plant cover, food production for wildlife, and individual tree data will be obtained on standard record forms. Data will be transferred to IBM cards for analysis.

1.159

Texas A & M University
Agricultural Experiment Station
College Station, Texas 77840

ESTABLISHMENT AND MAINTENANCE OF VEGETATION ON HIGHWAY RIGHTS-OF-WAY

W. G. McCully

Supported by *State of Texas*

Objectives:

1. To compare and improve specified methods of erosion control by determining requirements, planting materials and procedures for establishing a vegetative cover on finished slopes and other areas subject to soil erosion.
2. To adapt recommended agricultural methods of plant control to highway requirements.

1.160

Texas Parks and Wildlife Department
Marshall, Texas 75670

PUBLIC ACCESS SURVEY

Joe E. Toole

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To gather information concerning public access to public waters of Region 3-B.

Procedures: 1. All points of access to public streams and lakes will be physically checked to determine their availability to fishermen.

2. Records will be made of publicly owned rights-of-way where access to fishable, public waters is not now available to the fishing public.

3. All information and data will be recorded, cataloged, and mapped by county. This will be done with the help and assistance of game wardens of the Texas Parks and Wildlife Department and county officials for the concerned counties and areas.

1.161

Texas Parks and Wildlife Department
Austin, Texas 78767

PUBLIC ACCESS SURVEY OF PUBLIC WATERS IN REGION 2–A

Austin, Texas

Dwane Q. Smith

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

1. To locate existing points of public access to public streams and lakes.
2. To locate other points of access where public ownership of land exists.
3. To catalogue, evaluate, and map existing and possible access points to public lakes and streams.
4. To publish information collected in the Inland Fisheries Series.

Despite the relative abundance of lakes and streams in Region 2–A, the amount of fisherman access to these waters is unknown. This investigation is proposed to determine the amount and location of fisherman access available at the present time, as well as the amount and location of access which is needed.

Procedure:

I. All points of access to public lakes and streams will be physically checked to determine their availability to the fisherman.

(A) Streams

1. Public access points on road crossings will be located and catalogued. Catalogued data will include:

type of access, boat launching sites, types of fishing available, etc.

2. An effort will be made to estimate the amount of publicly owned shoreline available to the fisherman at each point of access.

3. Character of streams at public crossings will be recorded to estimate fishability of areas open to fishermen.

4. Types of fishing available will be recorded.

5. County Commissioners for concerned counties will be contacted to obtain information on public county roads and access points. Other information pertinent to this job will also be procured.

6. Resident Engineers for the State Highway Department will be contacted to secure information on public access at State and Federal highway crossings.

7. Public county records will be checked for public road crossings that may not be open at the present time.

8. Fees required for access and use of private facilities to public lakes and streams by the sport fisherman will be recorded.

B. Lakes

1. Information similar to the above listed will be obtained for the public lakes in Region 2-A.

2. Agencies, such as the Brazos River Authority, Corps of Engineers, etc., which exercise some authority over lakes of Region 2-A will be contacted to acquire information regarding public access to these lakes.

II. Special records will be made of publicly owned rights-of-way where access to fishable, public waters is not now available to the fishing public. This information may be used to make recommendations to county and State agencies for the purpose of providing the right of free public access to public waters at all road crossings where the right-of-way is owned by public agencies.

III. All information and data will be recorded, catalogued, and mapped by county. This will be done with the help and assistance of game wardens and conservation chiefs of the Texas Parks and Wildlife Department for the concerned counties and areas. Information called for will be recorded for each site investigated.

IV. Upon completion of the survey, the accumulated information will be published as a bulletin in the Inland Fisheries Series.

1.162

Texas Parks and Wildlife Department
Austin, Texas 78767

PUBLIC ACCESS SURVEY OF PUBLIC WATERS IN REGION 2–A

C. T. Menn

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective:

To gather information concerning public access to the public waters of Region 2-A (North Central Texas).

Segment Objectives:

1. To complete efforts to locate existing points of public access to public streams and lakes.
2. To locate other points of possible access where public ownership of land exists.
3. To catalogue and map existing and possible public access to streams and lakes, for use in public information bulletins and in recommending access development.

The majority of field data required to fulfill the PPS objective has been obtained. The short job period (two months) proposed here will enable project personnel to complete the survey. Complete data is required in order to carry out the objectives stated in Job A-4 of this project segment and to make future recommendations concerning access development.

Procedures:

1. All points of access to public lakes and streams will be physically checked to determine their availability to fishermen.

a. Streams

(1) Public access points at road crossings will be located and catalogued. Catalogued data will include: Type of access, boat launch-sites, types of fishing available, etc.

(2) An effort will be made to estimate the amount of publicly owned shoreline available to fishermen at each point of access.

(3) Character of streams at public crossing will be recorded to estimate fishability of areas open to fishermen.

(4) Types of fishing available will be recorded.

(5) County Commissioners will be contacted to obtain information on public county roads and access points.

(6) Resident Engineers for the State Highway Department will be contacted to secure information on public access at State and Federal highway crossings.

(7) Public county records will be checked for public road crossings that may not be be open at the present time.

(8) Fees required for access and use of privately owned fishing facilities at public lakes and streams will be recorded.

b. Lakes

(1) Information similar to that listed above will be obtained for the public lakes in Region 2-A.

(2) Public agencies (i.e., Corps of Engineers, River Authorities, Water Districts) which exercise authority over lakes of Region 2-A, will be contacted to acquire information regarding public access to these lakes.

2. Special records will be made of publicly owned rights-of-way where access to fishable, public waters is not now available to the fishing public. This information may be used to make recommendations to agencies for developing additional public access.

3. All information and data will be recorded, catalogued, and mapped by county. This will be done with the help and assistance of game wardens of the Texas Parks and Wildlife Department for the concerned counties and areas.

4. Upon completion of the survey, the accumulated information will be published as a bulletin in the Inland Fisheries Series.

1.163

Texas Parks and Wildlife Department
Austin, Texas 78767

POLLUTION STUDIES

C. T. Menn

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective:

To investigate and check pollution in the waters of the region.

Segment Objectives:

To determine the source and nature of natural or man-made pollutants which affect fish populations in the public waters of the Region 2-A.

Procedures:

1. If any areas are found to be denuded of plant or animal life, an effort will be made to find the nature and sources of any pollutants causing the damage.
2. Reports of pollution received by project personnel will be investigated.
3. Investigations will include appropriate water analyses and estimates of damage to fish populations including analysis of species affected.
4. Findings will be reported through channels to appropriate law enforcement agencies.

Location of Work: North Central Texas

1.164

Texas Parks and Wildlife Department
Austin, Texas 78767

PUBLIC ACCESS SURVEY OF PUBLIC WATERS OF REGION 2–B

Richard L. White

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective:

To gather information concerning public access to the public waters of Region 2-B.

Segment Objectives:

I. To locate existing points of public access to streams and lakes.

II. To locate other points of possible access where public ownership of land exists.

III. To catalogue, evaluate, and map existing and possible access points to public lakes and streams.

IV. To publish the information thus collected.

Procedures:

I. All points of access to public lakes and streams will be physically checked to determine their availability to fishermen.

A. Streams

(1) Public access points on road crossings will be located and catalogued. Catalogue data will include type of access, boat launching sites, type of fishing available, and related data.

(2) An effort will be made to estimate the amount of publicly-owned shoreline available to fishermen at each point of access.

(3) Character of streams at public crossings will be recorded to estimate fishability of areas open to fishermen.

(4) County Commissioners for concerned counties will be contacted to obtain information on public county roads and access points and other information pertinent to this job.

(5) Resident Engineers for the State Highway Department will be contacted to secure information on public access at State and Federal highway crossings.

(6) County records will be checked for road crossings that may not be open at the present time.

(7) Fees required for sport fishermen for access and use of private facilities on public streams will be recorded.

B. Lakes

(1) Information similar to the above listed will be obtained for the public lakes in Region 2-B.

(2) Agencies, such as the Lower Colorado River Authority, Blanco River Authority, and Corps of Engineers, which exercise authority on lakes of Region

2-B, will be contacted to acquire information regarding public access to these lakes.

II. Records will be made of publicly owned rights-of-way where access of fishable, public waters is now available to the fishing public.

III. All information and data collected will be recorded, catalogued and mapped by county. This will be done with the help and assistance of law enforcement personnel of the Texas Parks and Wildlife Department for all concerned counties.

IV. Upon completion of the survey, the accumulated information will be published as a bulletin in the inland fisheries series.

1.165

Texas Parks and Wildlife Department
Austin, Texas 78767

SURPLUS GAME AVAILABILITY

Walton S. Daniel

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

P.P.S. Objective: To determine annual population trends of various game species so as to direct the hunting public to areas having surpluses.

Segment Objectives:

1. To determine areas having surplus populations.
2. To recommend game harvest regulations on minor species.
3. To make information on game surpluses available to the public.

Procedures:

1. Deer and Turkey: Collect deer population density and range carrying capacity data from all areas (Job 2). Estimate turkey populations from roost counts and from sightings and landowner records in other areas (Job 2). Compile all data as related to harvest needs.

Bobwhite Quail: Continue to run whistle counts (Rosene) on the 31 established 20-mile transects (2 in each county of the survey region-3 in Coryell — Ft. Hood area) to show areas of quail surplus, and to establish trends. Counts are to be made twice each month on consecutive mornings, during June and July. Counts to be made at sunrise.

Squirrel: Conduct time-area counts (Goodrum) in typical habitat types in each county to show areas of squirrel surpluses and population trends. Counts to be conducted on 4 lines (5 stations each) in each of the 15 counties of the region. (60 lines — 300 station total). All counts to be made twice each month, in October and April or May.

2. Present harvest recommendations for the minor game species, along with deer and turkey recommendations at county public meetings and to the Parks and Wildlife Commission sessions.

3. Prepare group talks, newspaper items and magazine articles and furnish data to other personnel for similar use as required to obtain proper hunter and landowner participation in surplus game harvest.

1.166

Texas Parks and Wildlife Department
Austin, Texas 78767

SURPLUS GAME AVAILABILITY

Dennis L. Brown

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective:

To determine annual population trends of various game species so as to direct the hunting public to areas having surpluses. *Segment Objectives:* 1. To determine areas having surplus populations. 2. To make information on game surpluses available to the public.

Procedures:

1. Collect deer population density and range carrying capacity data from all areas (Job 2). Estimate turkey populations from roost counts in Goliad County and from sightings and landowner records in other areas. Make systematic roadside counts of quail and mourning doves and determine squirrel density by time-areas counts in strategic sample areas. Compile all data as related to harvest needs, and make harvest recommendations for minor game species, along with those of deer and turkey, at county public meetings and to the Parks and Wildlife Commission.

2. Prepare group talks, newspaper items and magazine articles and furnish data to other personnel for similar use as required to obtain proper hunter and landowner participation in surplus game harvest.

Location of Work:

Austin, Calhoun, Colorado, DeWitt, Goliad, Gonzales, Guadalupe, Jackson, Matagorda, Victoria, and Wharton Counties.

1.167

Texas Parks and Wildlife Department
Austin, Texas 78767

PUBLIC ACCESS SURVEY

E. W. Bonn

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To gather information concerning public access to the public waters of Fisheries Region 3–A.

Procedures: 1. Existing points of public access to public streams and lakes will be located, and checked to determine the location, description and available facilities. This information will be recorded on prepared forms. Upon completion of this job the accumulated information will be published as an Inland Fisheries bulletin.

Schedule: This is the first of an estimated three-year study including a one-year segment for publication of information.

1.168

Texas Parks and Wildlife Department
Austin, Texas 78767

SURVEY OF STATE PARK LAKES

E. W. Bonn

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective:

To determine specific needs and know management tools required to intensively manage the State Park Lakes in Fisheries Region 3–A.

Procedures:

Bonham, Daingerfield and Fort Parker State Park lakes will studied to determine if there is a need for water quality, population manipulation and vegetation control. (Eisenhower State Park lies on the shore of Lake Texoma and will be checked only for shoreline vegetation problems). This will include creel checks of fishermen and discussions with park employees. Each lake will be surveyed to determine the fish populations present. Collections will be made with gill nets, seines and trawls. Fish taken with such gear will be sorted, counted, weighed, measured, sexed and checked for stomach contents. Each lake will be surveyed to determine the physical, chemical and biological conditions which might influence fish production and harvest. Lakes will be mapped and sounded to determine size and volume of water. Water tests will be made to determine the chemical conditions. The influence of aquatic vegetation on fish harvest will be determined.

The foregoing information will be reported in detail, as separate units, in one completion report. Specific recommendations will be made for development work where justifiable. It is anticipated that this objective will be reached in one year and development work will evolve. However, a creel check will follow the development work to measure results in terms of fish harvest utilization.

1.169

Texas Parks and Wildlife Department
Austin, Texas 78767

SURPLUS GAME HARVEST, BLACK GAP WILDLIFE MANAGEMENT AREA

Sam Brownlee

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To determine the effects of various hunting pressures on deer numbers, distribution, age and sex structure, harvest and hunter success.

To harvest game species on the Black Gap Wildlife Management Area.

Procedure: After the relative carrying capacities of the area are estimated annually, established census lines will be used to determine populations for each species and number of surplus animals and birds to be removed. Data used to determine populations and carrying capacities of the area are derived from Jobs 2 and 5, W–57–R and Job 3, W–48–D. The surplus will be harvested by controlled public hunting. Applications will be accepted and drawings will be held, using an impartial method to select the hunters. Hunts will be held during the regular seasons unless emergency conditions require attention at other periods of the year. Accurate records of all hunts will be kept.

Location of Work: Black Gap Wildlife Management Area

1.170

Texas Parks and Wildlife Department
Austin, Texas 78767

PUBLIC LAKE ACCESS AND FACILITIES SURVEY

Paul Fisher, Jr.

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To obtain information regarding general characteristics, access and facilities available at public waters of Region 1–C.

Procedures: Information regarding general characteristics, access, and facilities available at public waters of Region 1–C will be obtained and recorded. This information will be presented in a manner to facilitate publication of any particular component part. Sources of information will include D.J. job completion reports, other governmental agency reports, controlling agencies of the respective waters, and personal observations of project personnel. Information concerning public lakes will be obtained first, and information concerning streams will be obtained during the following segment.

Manuscript preparation for publishing will be done during the third year.

1.171

Texas Parks and Wildlife Department
Austin, Texas 78767

PUBLIC LAKE ACCESS AND FACILITIES SURVEY

Billy J. Follis
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:
To obtain information regarding general characteristics, access and facilities available at public waters of Region 1–B.

Procedures:
Information will be gathered and compiled from D. J. job completion reports, other governmental agency reports, controlling agencies of the respective lakes, and field investigation by project personnel. Any additional public lakes found in the course of the study will be added.

1.172

Texas Parks and Wildlife Department
Corpus Christi, Texas 78403

PUBLIC ACCESS SURVEY OF PUBLIC WATERS OF REGION 5–B

John C. Barron
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

P.P.S. Objective: To gather information concerning public access to the public waters of the region.
Segment Objectives: To locate, evaluate, and map existing and possible access points to the coastal waters of Region 5–B.

Procedures:
1. All points of access will be checked for the following data:
    - a. The amount of publicly owned shoreline available.
    - b. Types of fish and fishing.
    - c. Proximity to boat launch areas.
    - d. Usage fees for private facilities.
    - e. Suitability for general outdoor recreational activities.

2. Upon completion of the survey, the accumulated information will be included in the manuscript to be prepared under Job A–3, F–6–R–15.

1.173

Texas Parks and Wildlife Department
Corpus Christi, Texas 78403

POLLUTION INVESTIGATIONS

John C. Barron
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

P.P.S. Objective:
To investigate and check pollution in the waters of the region.

Segment Objectives:
To investigate pollution in the waters of the region.

Procedure:
Reports of fish killing pollution by sportsmen or game wardens will be investigated. The investigation will include appropriate water analyses, an estimate of the damage to the fish population, and the species affected. If possible the source of man-made pollutants will be determined and the persons responsible will be notified as well as the Law Enforcement Division.

1.174

Texas Parks and Wildlife Department
Austin, Texas 78403

PUBLIC ACCESS SURVEY OF PUBLIC WATERS OF REGION 4–A

Alan G. Wenger
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective:
To gather information concerning public access to the public waters of Region 4–A.

Segment Objectives:
1. To locate, catalogue, evaluate and map existing and potential points of access, to public waters.
2. To publish information collected, in the Inland Fisheries Series.

Procedures:
I. All points of access to public lakes and streams will be physically checked to determine their availability to the fisherman.
A. Streams
(1) Public access points at road crossings will be located and catalogued. Catalogued data will include: types of access, boat launching sites, types of fishing available, etc.
(2) An effort will be made to estimate the amount of publicly-owned shoreline available to the fisherman at each point of access.
(3) Character of streams at public crossing will be

recorded to estimate fishability of areas open to fishermen.
(4) Types of fishing available will be recorded.
(5) County Commissioners for concerned counties will be contacted to obtain information on public county roads and access points. Other information pertinent to this job will also be procured.
(6) Resident Engineers for the State Highway Department will be contacted to secure information on public access at State and Federal highway crossings.
(7) Public county records will be checked for public road crossings that may not be open at the present time.
B. Lakes
(1) Information similar to that listed above will be obtained for the public lakes in Region 4–A.
(2) Agencies, including the San Jacinto River Authority, Corps of Engineers and others which exercise authority over the lakes of Region 4–A will be contacted to acquire information regarding public access.
II. Special records will be made of publicly owned rights-of-way where access to fishable, public waters is not now available to the fishing public. This information may be used to make recommendations to county and State agencies for providing access to public waters at road crossings.
III. All information and data will be recorded, catalogued and mapped by county. This will be done with the help and assistance of Parks and Wildlife Department game wardens for the concerned counties and areas. Information called for on the attached form will be recorded for each site investigated.
IV. Upon completion of the survey, the accumulated information will be published as a bulletin in the Inland Fisheries Series.

1.175

Texas Parks and Wildlife Department
Marshall, Texas 75670

SURVEY OF STATE PARK WATERS

Joe E. Toole
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To improve fishing in State Park Lakes.

Procedures: 1. Each State Park will be checked to determine the present status of fishing. 2. Each State Park Lake will be surveyed to determine the fish population present. 3. Each State Park Lake will be surveyed to determine the physical, chemical and biological conditions which might influence fish production and harvest. 4. Recommendations for future development work will be made as needed.

1.176

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C. 20240

STUDY OF PRIVATE OUTDOOR RECREATION ENTERPRISES

Lester F. Faber
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

Major Objectives: 1. To provide an estimate of the number and type of privately owned outdoor recreation enterprises in the U.S. and in each of the nine Census Divisions. 2. To obtain a profile of these enterprises or resources nearby, fees charged, origin of patrons, nature and history of the operation, investment and financial problems.

Methodology: The survey used area sampling techniques, with a stratified probability sample of 332 counties. Stratification was based on proximity to centers of population, population size, water surface area, climate, income, etc. Within each Census Division, counties were placed in groups of equal numbers. From each group, two counties were selected with equal probability. Each selected county was divided into 16 to 20 area sampling segments and two or three of these segments were then selected with equal probability. During mid-summer 1965, interviewers cruised these segments and listed each observable private recreation enterprise and obtained an interview with the owner or manager. The recorded enterprises for each sample segment were checked against a telephone list of enterprises that had been prepared earlier with the assistance of a local committee in each of the sample counties. If the lists compared favorably for the sample segments, some assumptions were made about the accuracy of the list for the entire county.

1.177

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C. 20240

FEDERAL AGENCY OUTDOOR RECREATION PLANNING

Dwight L. Patton
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This study will examine the planning efforts of 17 Federal agencies having outdoor recreation programs.

The purposes of the study are:
(1) To develop an overview of Federal agency planning in outdoor recreation; (2) Identify problems in the Federal outdoor recreation planning effort, particularly gaps and overlaps; (3) Recommend adjustments,

if needed, in the Federal outdoor recreation effort; and (4) Develop a basis for more intensive studies of problems in outdoor recreation planning.

1.178

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C. 20240

OUTDOOR RECREATION RELATED FEDERAL PROGRAMS—AN INVENTORY AND DIGEST

Joseph T. Fromme
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This survey-type study involves the inventory, analyses, and reporting on the present role in outdoor recreation of the Federal Government. It will cover, by program, the total effort of agencies in the Executive Branch of the government. It will include agency programs which directly affect outdoor recreation as well as those which involve outdoor recreation in a peripheral or secondary way. Indications are that between 70 and 90 Federal agencies will be contacted in the inventory.

For each program inventoried, the report will show: (1) A program description including objectives, recipients, quantities, area involved, and any other pertinent data; (2) Legislative and/or administrative authority for the program; (3) Publications dealing specifically with the program.

A separate section of the report will cover councils, boards, commissions and authorities which do not have outdoor recreation programs per se but which have advisory roles in the outdoor recreation discipline.

1.179

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C. 20240

SCENIC RIVERS STUDY

Stanford Young
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

A nationwide study was coordinated by the Bureau of Outdoor Recreation in 1963–64 to inventory and evaluate wild or scenic river needs and possibilities. The study was supervised by a 5-member Study Team composed of representatives of the Departments of the Interior and Agriculture.

Based on the results of the study, a report "Wild Rivers" was published, and legislation was recommended by the Administration for the establishment of a Nationwide System of Scenic Rivers. Nine rivers are proposed for initial "national scenic river" designation. Thirty-five other rivers are earmarked for further evaluation within 10 years after enactment of a Scenic Rivers Bill. Other "candidate" rivers will be studied by the Secretary of the Interior and Secretary of Agriculture. The proposed legislation also provides for the inclusion of "State and local scenic rivers" in the Nationwide System.

1.180

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C. 20240

ISLAND STUDY

Stanford Young
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This survey and planning study has three major objectives:

(1) Inventory all 10-acre or larger islands in the U.S., Puerto Rico, and the Virgin Islands by size, ownerships, and development status.

(2) Identify and evaluate those islands which have significant wilderness, historical, or other recreational values.

(3) Develop a program for island conservation.

The Island Study was started during fiscal year 1967. The inventory phase of this study should be completed in July of 1967. The detailed studies of those islands with significant recreational values should be completed by January of 1968 and the final report, outlining a program for island conservation, should be released during fiscal year 1969.

1.181

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C. 20240

THE TRAILS STUDY

Stanford Young
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This survey-type study provided the background needed in developing the draft bill which the Department of the Interior submitted to the 90th Congress to establish a Nationwide System of Trails.

The proposed legislation would grant immediate National Scenic Trail status for the Appalachian Trail, a Continental Divide Trail, the Pacific Crest Trail, and a Potomac Heritage Trail. It would also expand other State and Federal trails. With the approval of the Secretary, State and locally administered trails may be designated as parts of the Nationwide System.

Secretary Udall initiated this study by the appointment of a four-man committee in July of 1965. The first phase of the work of the Committee terminated with the release of its report, *Trails for America*, on January 15, 1967.

1.182

Bureau of Outdoor Recreation
Mid-Continent Regional Office, Building 41
Denver, Colorado 80225

MISSOURI RIVER NATIONAL RECREATION AREA STUDY

Robert H. Sharp
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This survey-analysis type study is designed to determine if all or parts of the Missouri River from Yankton, South Dakota, to Fort Benton, Montana, might qualify as a National Recreation Area.

The Bureau of Outdoor Recreation is analyzing the present and future recreational needs, supplies, and demands of the entire study area and of its several subsections. It is evaluating each subsection under the National Recreation Area Criteria, and it will prepare a report presenting its findings and recommendations.

1.183

Bureau of Outdoor Recreation
Northeast Regional Office
128 North Broad Street
Philadelphia, Pennsylvania 19107

THE CONNECTICUT RIVER STUDY

Rolland B. Handley
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

Objective—To determine the feasibility and desirability of establishing all or parts of the Connecticut River Valley as a national recreation area.

The present and future recreational needs, supplies, and demands will be analyzed along the Connecticut River itself. This study will be broad in scope giving consideration to such things as open spaces and cultural areas as well as picnic areas, etc.

Procedure—A BOR study group will: (1) Evaluate the recreational, fish and wildlife, forest, and water and power resources of the Connecticut River Valley; (2) Evaluate the Connecticut River and its component parts under the National Recreation Area Criteria, and (3) Prepare a report containing recommendations.

The above can be accomplished in the two years allotted by working closely with and by drawing heavily upon the data being collected by other study groups such as the group preparing the Connecticut River Basin Comprehensive Plan.

1.184

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C.

COORDINATION OF FEDERAL OUTDOOR RECREATION PROGRAMS

Milton A. Pilcher
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This study will review Federal programs in outdoor recreation to determine areas where coordination efforts by BOR are needed and will be a major supplement to the Nationwide Outdoor Recreation Plan. The resulting report will summarize data from previous studies and will analyze the Federal programs by such major functional elements as planning, land acquisition, technical and financial assistance, and research. In exploring the needs for further coordination of Federal programs and the role of BOR in meeting these needs, heavy reliance will be placed on the recommendations of BOR personnel in Washington and in the regions.

1.185

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C. 20240

DETERMINATION OF PROCEDURES FOR COORDINATED REGIONAL RECREATION PLANNING

William E. Rennebohm
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

In an effort to improve the coordination of outdoor recreation planning by all levels of government, this study involves determination of the mechanics and procedures necessary for developing regional recreation plans. It will encompass the planning interests of Federal, State and local governmental agencies and the private sector as well.

Two avenues of investigation are being pursued in connection with the project. First, an analysis is being made of past, present and proposed regional planning and action programs in an attempt to ascertain the type of organizational structure best suited both to develop a regional recreation plan and to carry out subsequent plan implementation.

The second investigation involves two dissimilar geographical areas—areas with differing resources, populations, governmental structures and land ownership patterns. They are being used as non-theoretical models in determining regional boundary selection criteria and to provide "case studies" of the actual problems to be met in developing plan objectives, organizational procedures and coordinating machinery.

The initial study goal is to work out realistic procedures by which a planning group representing units of differing levels of government and private groups can develop a coordinated regional recreation plan.

1.186

Bureau of Sport Fisheries and Wildlife, U.S.D.I.
P.O. Box 4218
Panama City, Florida 32401

INVENTORY AND ATLAS OF GULF COAST SPORT FISHING FACILITIES

Norman G. Vick
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

A complete inventory of fishing facilities and fishing areas for the coast of the Gulf of Mexico from Brownsville, Texas to Key West, Florida will be made. All available reports and brochures on salt-water sport fishing will be obtained through the circulation of a facilities checklist to recreational and fishing committees of chambers of commerce in coastal communities. Field trips will be made to confirm and add to the data obtained through correspondence. The results will be reviewed by State conservation agencies for accuracy and completeness. The information will be published as a single atlas consisting of unit maps which together will cover the whole coast.

1.187

U.S. Department of Agriculture
Washington, D.C. 20250

ANALYSIS OF THE FEASIBILITY OF EASEMENTS AND PROTECTIVE COVENANTS FOR GUIDING RURAL LAND USE

Erling D. Solberg
Supported by *U.S. Department of Agriculture*

Object: To explore the feasibility of using easements, protective covenants, deed restrictions, and similar arrangements as tools for effecting land use adjustments, resource conservation, and supply management, and for guiding land uses for agriculture, recreation, forestry, and nonfarm development in rural areas, especially the crop-grazing fringe and rural-urban fringe.

Place of Work: Studies will be made of (1) continued examination and analyses of easements, protective covenants, related contractual regulatory measures as developed and used in urban area, indicating the manner of creation, scope, methods of enforcement, procedures for modification and termination; (2) types of easements, such as billboard easements, scenic easements, and development right easements, and others; and (3) the use of selected kinds of easements including negative cropping easements, and protective covenants, deed restrictions, etc., in rural areas. Library and field work are contemplated. Besides contracts with farm owners and operators, field contracts will include private firms, associations, and agencies. The characteristics of each legal tool will be examined in relation to the types of action needed to effect changes in land use or controls over use. Modifications needed to make the legal devices function more effectively for rural purposes will be developed.

1.188

U.S. Department of Agriculture
Washington, D.C. 20250

NATIONAL LAND USE INVENTORY

Norman E. Landgren
Supported by *United States Department of Agriculture*

Object: To provide a continuing inventory of major agricultural and nonagricultural uses of land by States and regions; to identify trends in land use by States and regions, including shifts in major agricultural uses, reversion of cropland to grass and trees, development of agricultural lands, and the prior uses of lands being converted to nonagricultural uses; and to analyze trends in major land uses as they relate to present and future agricultural production requirements.

Plan of Work: Data will be collected from various sources, analyzed and summarized to provide a continuing inventory of the amount of land in the U.S., in cropland, pasture and grazing land, woodland, forest, special-purpose, and other uses. Analyses in land going into special uses such as urban, industrial, highways, airports, reservoirs, parks, and other recreational facilities, etc.; amount of land being developed for agriculture; and future implications, improvement in current estimates of planted and cultivated cropland and summer fallow. Data will be obtained on acreages and productivity of improved pastures, soil improvement and cover crops and emphasis placed on acreage and quality of land under multiple-use management, and amounts and location of publicly owned land used for crops.

1.189

Federal Water Pollution Control Administration
Cincinnati, Ohio 45226

IDENTIFICATION, ECOLOGY AND SIGNIFICANCE OF ALGAE IN ENVIRONMENTAL SANITATION

C. M. Palmer

Supported by *Federal Water Pollution Control Administration, U.S.D.I.*

Determination, evaluation and manipulation or control of algae that are significant because of either interfering with or being utilized in aquatic processes or situations. Such situations involve pollution detection and control, sewage treatment (particularly the use of stabilization ponds), "self-purification" of streams, conservation and re-use of water, water treatment for community or industrial use or for recreation or irrigation. Other situations that may be associated with pollution or treatment are the development of algal products, production of toxic conditions by aquatic growths and use of algae in completion of biological cycles in manned outer-space ships. The project is planned for an indefinite period with various phases emphasized at different times.

1.190

U.S. Geological Survey
Water Resources Division
Lansing, Michigan 48901

HYDROLOGY OF RIVER-BASED RECREATION

G. E. Hendrickson

Supported by *Geological Survey, U.S.D.I.*

This research is part of the program of water resources investigations conducted by the U.S. Geological Survey in cooperation with the State of Michigan to analyze the hydrologic factors related to use of cold-water rivers in a glacial terrain, to provide guidelines for assessing the potential recreational value of such rivers, and to determine how development by man in the watersheds affects the recreational value of the streams.

Methods:

On the basis of streamflow and water quality records, geology, topography, and amount of development, select representative rivers in Northern Michigan. Assemble information regarding streamflow characteristics, stream morphology, water temperature, groundwater levels, and areas of ground-water discharge. Obtain information on recreational potential of rivers, including fish populations and present and future use for fishing, boating, and camping. Interpret relationships of recreational uses to hydrology of the watershed. In developed watersheds obtain information on surface and ground water withdrawals, disposal of sewage and other wastes, regulation by dams, and indirect controls by timbercutting and other changes in land use in the watersheds. Report on relationships of characteristics of streamflow, water quality, and stream morphology to river-based recreation.

1.191

U.S. Geological Survey
Water Resources Division
St. Paul, Minnesota 59101

HYDROLOGIC PARAMETERS CONTROLLING RECREATIONAL USE OF MINNESOTA RIVERS

R. F. Brown

Supported by *Geological Survey, U.S.D.I.*

This research is part of the program of water resources investigations conducted by the U.S. Geological Survey in cooperation with the State of Minnesota.

Selected Minnesota rivers have been designated by the State as "Wild Rivers" and knowledge of the geologic and hydrologic environment of these streams is required by conservationists and recreation managers and planners to evaluate their recreational use. Available records of streamflow, water quality, and geology will be evaluated in terms of the controlling influence of these parameters on the present and future recreational value of the rivers. Longitudinal profiles of streams will be made, channel morphology will be studied, and additional measurements of streamflow and water quality parameters will be made and their relation to recreational use will be evaluated.

1.192

Water Resources Division
U.S. Geological Survey
Albuquerque, New Mexico 87103

CAVE CLIMATE

Supported by *National Park Service, U.S.D.I.*

The study objectives are:

1. To determine temperature, humidity and water, CO_2 pressure and air movements in the cave over a sufficient period to establish year-round pattern and apparent trends.
2. To relate present conditions to those of the past and attempt to determine causes of any changes.
3. To develop a system for monitoring conditions in the future.
4. To determine effects of air circulation through the elevator shafts, cave lighting, varying numbers of people exhaling CO_2 and releasing heat, and of surface

developments on the atmosphere and water of the cave.

5. To propose remedial measures as needed for preservation and use of the cave, and guidelines for future development and use.

Research being conducted in Carlsbad Caverns National Park.

1.193

Pacific Southwest Forest and Range Experiment Station
Berkeley, California 94701

DETERMINATION OF ECOLOGICAL FACTORS IMPORTANT TO MANAGEMENT OF MOUNTAIN MEADOWS

Supported by *National Park Service, U.S.D.I.*

The research involves finding answers to the following questions:

1. What are the reasons for lodgepole encroachments?
2. What effect does pressure of livestock, travel, grazing, and microbes have on grass stands?
3. What are the rates in magnitude of losses of nutrition from mountain meadow ecosystems?
4. What is the degree and significance of water table fluctuations?

Research being conducted in Sequoia-Kings Canyon National Parks.

1.194

Utah State Department of Fish and Game
Salt Lake City, Utah 84110

ANALYSIS OF WATERFOWL KILL CARD DATA

John E. Nagel

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To Determine:

1. Number of waterfowl hunters in Utah.
2. Average kill of ducks and geese per hunter per season.
3. Total kill of ducks and geese in Utah.
4. Average number of trips afield per hunter per season.
5. Total waterfowl hunting trips made in the State.

Procedure:

1. Approximately 16,000 questionnaires will be mailed to a randomly selected sample of hunting license buyers throughout the State. The total number of adult waterfowl hunters will be determined by applying the ratio of duck stamp buyers reporting that they hunted to the total stamp sales figure supplied by the U.S. Post Office. Numbers of juvenile waterfowl hunters will be determined from the ratio of hunt to no-hunt replies from questionnaire data as compared to total juvenile license sales for the State. These two figures combined will give the total number of Utah waterfowl hunters.

2., 3., 4., and 5. Information received from questionnaire returns concerning the number of hunting trips and waterfowl kill per trip will be statistically analyzed by the University of Utah Computer Center and expanded to arrive at figures for the average and total waterfowl kill and number of hunting trips over the State. These data will in turn be used in developing programs for more intensive management of the State's waterfowl resource.

1.195

Utah State University
Logan, Utah 84321

RECREATION VALUE OF WATER IN A MUTUALLY EXCLUSIVE SETTING

R. S. Whaley

Supported by *Office of Water Resources Research, U.S.D.I. and Utah State University*

The development of new water storage facilities in arid lands of the West has been accompanied by growth of water-based recreation. Increases in recreation are generally complementary to the main purpose of the storage facility. But this situation is not inevitable. For example, the proposed water management plan for the Central Utah Project suggests an adverse effect upon several rivers and streams, historically important for sport fishing. Maintenance of fishing quality would necessitate lessening the efficiency of the project's water management plan.

The objective of this study is to determine what sport fishing gains would be needed to offset the potential losses in primary benefits that would be associated with management of Central Utah Project waters to preserve fishing values.

Two steps are necessary to reach our objective. First, it is necessary to predict angler use of streams with various catch-ratios. A use-prediction model will be developed from a prior judgment that the relevant factors influencing choice between different fishing sites are: the opportunities available at the site (catch success), competing fishing opportunities, and travel time to the site in question and competing alternatives.

A second step will be to examine alternative methods for valuing sport fishing. Once a value for fishing comparable to the values for other water benefits can be developed, it will be possible to optimize water management regimes to maximize returns.

1.196

Utah State University
Logan, Utah 84321

A TEST OF THE FEASIBILITY OF PREDICTING THE DURABILITY OF RECREATION SITES UNDER BOTH MANAGED AND UNMANAGED CONDITIONS

J. Alan Wagar
Supported by *Forest Service, U.S.D.A.*

This study examines the feasibility of relating the durability of potential recreation sites to measurable site factors. Relationships, if adequately described, will then be used to predict the durability of potential sites before development funds are committed. Because management may greatly increase site durability, relationships are being examined for both managed and unmanaged conditions.

1.198

Utah State University
Logan, Utah 84321

IMPACT OF RECREATIONISTS ON SELECTED SITES

S. R. Tocher
Supported by *State of Utah*

Objectives:

1. Establish initial impact of recreationists on vegetation and soils on previously unused sites.
2. Relate changes in low level vegetation to treatment by irrigation and fertilization, amount of use, and site factors.
3. Study responses of growth rate of overstory trees in camp to paired trees outside camp.

Description of the work:

Twenty-seven .064 acre plots have been laid out, mapped and measured. Treatment effectiveness will be tested by vegetation responses and changes in rates of infiltration.

Selected plots will be irrigated and fertilized. Regressions analysis will relate vegetation to use, facility location and site factors.

1.199

Utah State University
Logan, Utah 84321

CHANGES IN CAMPGROUND VEGETATION AND SOILS AS RELATED TO THE ADDITION OF FERTILIZER AND WATER, TO LEVELS OF VISITOR USE, AND TO SITE FACTORS—CRYSTAL SPRINGS CAMPGROUND, CACHE NATIONAL FOREST

S. R. Tocher
Supported by *State of Utah*

Management treatments will be applied to campsite plots. These will consist of (a) water, (b) fertilizer, (c) combination water and fertilizer, and (d) control. The amount and changes in understory vegetation of the campgrounds will be related to these treatments, to the amount of visitor use, and to the site factors such as soil texture and structure, competition from nearby trees, and topography.

Changes are to be related to treatments, visitor use, and site variables by multiple regression methods.

At each of 27 family camp units, a .064-acre plot has been established. This plot coincides with the area expected to receive the heaviest impact, thus vegetation changes due to recreation use should occur within boundaries of the plots. Within the .064-acre plot, 16 circular mil-acre plots have been established for the measurement of understory vegetation. Within the .064-acre plots trees have been selected for measurement of radial growth by dial-gauge microdendrometer methods.

1.200

Utah State University
Logan, Utah 84321

DEVELOPMENT OF COMPREHENSIVE INVENTORY SYSTEMS FOR RECREATION PLANNING IN UTAH

John D. Hunt
Supported by *State of Utah*

Objectives:

To develop data classification systems which allow systematic summarization of:

(a) Environmental land characteristics which have a bearing on the suitability of land for various kinds of recreation development.

(b) Existing recreation facilities, and

(c) Potential recreation supply.

To inventory the existing and potential public and private recreation facilities of Utah so as to insure completeness and compatibility of recreation supply data.

1.201

Intermountain Forest and Range Experiment Station
Missoula, Montana 59801

WESTERN WILDERNESS RECREATION

Robert C. Lucas
Supported by *U.S.D.A., Forest Service*

Object: To better understand (1) western wilderness environments, (2) plant and animal ecology in wilderness situations, and (3) seek ways of safely accommodating increased numbers of visitors without destroying the wilderness environment or the wilderness experience.

1.202

Utah State University

COOPERATIVE FOREST RECREATION RESEARCH—UTAH STATE UNIVERSITY

J. Alan Wagear

Supported by *U.S.D.A., Forest Service*

Object: To stimulate and guide graduate study and research in forest recreation; and to develop techniques for planning outdoor recreation and to develop and manage wild lands in the Intermountain West for recreational use.

Plan of work: The project leader will act as advisor for programs of graduate study related to outdoor recreation. Capable students will be recruited from Utah State University and other nearby universities. Research by the project leader will seek ways to maintain and improve heavily used recreation sites and develop methods for measuring recreation use.

1.203

University of Vermont
Burlington, Vermont 05401

ECONOMICS OF MULTIPLE USE OF FORESTED LAND

Frederic O. Sargent

Supported by *U.S.D.A., Forest Service*

Objective: (1) To collect data concerning forest types, ages, and ownerships found in Vermont and relate this data to management costs and returns under selected market conditions. (2) To identify and objectively define classes of multiple uses of forested land. These classes will include but not be limited to (a) forested land and farming, (b) forested land and recreation (fishing, hunting, bridle trails, camping, hiking, and skiing), (c) forested land with rural nonfarm residences, (d) forested land with water conservation areas, (e) forested land with wildlife, and (f) forested land with scenery. (3) The classes and categories of forested land and multiple use of forested land will be mapped in selected sample areas.

Procedure: The pragmatic objective of this project is to supply information which will be useful in regional land use planning. Since multiple resource-multiple purpose land classification systems have not been widely developed and used for planning purposes, a secondary objective of this project will be methodologically to develop and improve methods of classifying land with reference to present multiple uses and potential single and multiple uses.

1.204

University of Vermont
Burlington, Vermont 05401

FACTORS INFLUENCING USE INTENSITY OF SKI AREAS IN VERMONT

Malcolm I. Bevins

Supported by *State of Vermont*

The principal objective of this study is to describe the factors which significantly affect use intensity of individual ski areas in Vermont. This will be done with specific reference to location, type, and interrelationship of facilities. Analysis of data should yield a basis for predicting use intensity under given conditions. This basis will be tested by applying the predictive method to new ski areas upon completion of the primary objective.

The Vermont ski industry will be identified in spatial terms defining the levels of agglomeration of facilities. Secondary data relating to lift facilities, lodging and dining capacity of the area, and climatic conditions will be collected. Using a questionnaire to measure use intensity and relative factors, managers of all individual ski areas with aerial lift facilities will be interviewed. Data for both a good year and a bad year will be collected.

1.205

West Virginia University
Agricultural Experiment Station
Morgantown, West Virginia 26506

FOREST FIRE PREVENTION THROUGH PUBLIC INTEREST IN GAME MANAGEMENT IN SOUTHERN WEST VIRGINIA

Robert L. Smith

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Measure changes in attitudes toward and interests in land of a hunting group actively cooperating with coal company owners, during a game management program on coal company lands. Determine effect of a cooperative wildlife habitat improvement program on game population in the area.

Cover the area. Develop management plan for land under lease to hunting club. Direct habitat improvement work on land by club members. Develop questionnaires to attempt to measure attitude changes toward land and game by hunting public. Study vegetation and game populations on area, particularly as both are affected by forest fires and activities of local populations.

1.206

Roy F. Weston, Inc.
West Chester, Pennsylvania 19380

WATER QUALITY INVESTIGATIONS TO DETERMINE FEASIBILITY OF RECREATIONAL RESERVOIR ON SWATARA CREEK

C. H. McConnell
Supported by *Commonwealth of Pennsylvania*

To establish current water quality through continuous monitoring of the specific conductance of the stream water, sampling and testing of the water at a number of locations along the stream; estimate the quality characteristics of the proposed impounded water at the selected reservoir site; compare such quality characteristics with water quality requirements for recreational purposes; evaluate the need for changing water quality; and enumerate actions required to accomplish essential water quality changes.

1.207

University of Wisconsin
Madison, Wisconsin 53715

RECREATIONAL FACILITIES IN NORTHERN WISCONSIN

Sydney D. Staniforth
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives:

1. Evaluate the potential to expand the market for recreational facilities of Northern Wisconsin and determine the geographic areas in which this market expansion represents the greatest potential.
2. Determine the relative importance of various features and facilities to consumers.
3. Investigate the decision process by which recreation plans are made and the nature of competition Wisconsin faces in this decision.
4. Determine the effects marketing the basic natural resources of the area in different forms and uses will have on returns to resource owners and employment and income in the area.

Work Proposed:

The initial phase of the study will be an analysis of the factors affecting demands, conducted through a survey of potential users of recreational facilities. The next phase of the project will estimate the expenditures of those recreating in the area. The final phase of the study will analyze the effects of marketing basic recreational resources through alternative avenues or uses. Due to basic differences in natural resources and markets, this whole analysis will be conducted separately for Northeastern and Northwestern Wisconsin.

1.208

Wyoming Game and Fish Commission
Box 1589
Cheyenne, Wyoming 82001

DETERMINATION OF BIG GAME HARVEST

Rex Corsi
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

P.P.S. Objectives: The State desires to obtain harvest information for the management of game populations throughout Wyoming. The general questionnaire will be conducted by personnel at the University of Wyoming as specified by contract agreement, dated June 1, 1962.

Segment Objectives: 1. To determine the 1966 big game harvest in Wyoming. Data will be compiled by geographical sub-divisions called Management Units and Areas. Information will be collected relative to sex and age classes of the harvest and kill locations. 2. To collect and analyze harvest data from hunters participating in all special permit hunts.

Procedures: 1. (a) A random mail questionnaire will be conducted at the close of the hunting seasons by the University of Wyoming to obtain statewide harvest information on elk, deer, and antelope. (b) Names and addresses of the desired hunter samples of all big game licenses will be compiled in the Cheyenne office and forwarded to the University of Wyoming for mailing to hunters. Name and address collecting will commence as books become available and continue until all license books are sampled. (c) Bias harvest surveys may be conducted in selected areas during the hunting seasons to check validity of harvest surveys. 2. (a) All permittees holding special permits, (Elk, Moose, Sheep) in special permit areas will be contacted by mail questionnaires. (b) Information will be collected on participation in the hunt, hunter success, sex, age and location of kills. (c) Attempts to contact nonresidents in the field will be made to obtain the most complete information at no cost to the project. (d) All harvest information for each management area will be analyzed for factors important in establishing hunting seasons for these areas. (e) All special permit harvest information will be included in the Statewide big game harvest report.

1.209

Texas Parks and Wildlife Department
Austin, Texas 78711

PUBLIC LAKE ACCESS AND FACILITIES SURVEY

George G. Henderson, Jr.
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To obtain information regarding general characteristics, access, and facilities available at public waters of Region 1–D. *Procedures:* Access routes and points of access to public waters and facilities available to sportsmen will be determined and recorded. General characteristics pertinent to fishermen needs will be recorded. Information will be obtained from D.J. job completion reports, governmental agency reports, controlling agencies of the respective waters and field investigation by fisheries personnel. The information will be presented so that component parts could be published separately. Public lakes and public streams will be studied during two separate segments. Public lakes will be covered first.

2. USER STUDIES

2.1

Alabama Department of Conservation
Game and Fish Division
Montgomery, Alabama 36107

STUDY OF THE ALABAMA DEER HUNTER

Francis X. Lueth
Supported by *Sport Fisheries and Wildlife, U.S.D.I.*

The purpose of this job is to study the hunting habits and preferences of the Alabama deer hunter. Standardized forms will be used to collect data on the number of hunters per hunt, number of dogs, approximate acreage hunted, weather conditions and harvest. Each form will cover a day's hunting activity. The data collected will be analyzed to determine, if possible, which factors affect the harvest. In addition, seasonal club kill records are available for a number of clubs over a period of years. These will be continued as an index of changes in total harvest.

The data will be collected Statewide during the hunting and post hunting seasons by the Study Leader, District Biologists and Conservation Officers. Results will be presented in the Federal Aid annual report.

2.2

Alabama Department of Conservation
Game and Fish Division
Montgomery, Alabama 36107

WATERFOWL HARVEST AND HUNTING PRESSURE

W. W. Beshears
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To determine the waterfowl harvest and hunting pressure in Alabama.

Procedure: The field phase of this job will be to conduct hunter bag checks periodically during the hunting season on the more important waterfowl hunting areas within the State (mainly TVA public shooting areas and Mobile Delta) to obtain information on the number of birds killed, species composition, sex and age ratios, kill per hour of hunting effort, and crippling loss. The office phase will include tabulation and analysis of the total harvest data, and comparison with similar data provided by the Bureau of Sport Fisheries and Wildlife's postal kill survey plus the statistically designed State game kill questionnaire.

Location of Work: Field phase—TVA public shooting areas, Mobile Delta, Demopolis Lake, and possibly certain private areas such as Dollarhide Club and Sumter Farms. Office phase—Montgomery and Jacksonville.

2.3

Alaska Department of Fish and Game
Juneau, Alaska 99801

SNOW VEHICLE/CARIBOU HARVEST STUDY

Terry A. McGowan
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:
To attempt to evaluate the effects on the caribou harvest of the rapid increase in the use of snow vehicles by hunters. To determine the effects, if any, of hunting by snow vehicles on caribou distribution and movements. To observe and record the behavior of caribou when hunted by snow vehicles.

Procedures:
1. Hunters using conventional methods and those using tracked snow vehicles will be interviewed to determine hunter success, hunter opinions, behavior of caribou and distribution of kill (distance from road).
2. Caribou will be approached and/or pursued using snow vehicles and simulated hunting techniques in order to record the actions and reactions of the animals to this type of conveyance. Detailed observations will be made on caribou behavior according to sex, age, band or herd size, habitat type, time of day, closeness of approach, etc.

2.4

University of Arizona
Tucson, Arizona 85717

SURVEY OF HUNTER AND FISHERMAN EXPENDITURES

William C. Davis
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective: To determine the amount of money spent in Arizona during calendar year 1965 on the following: (a) fishing, (b) big game hunting, (c) small game hunting, (d) migratory bird hunting, (e) nongame and predatory animal hunting, (f) salt water fishing and (g) general purchases pertaining to hunting and fishing. To determine the economic value of individual species of small and big game harvested and of various species of game fishes.

Segment Objectives: (a) To estimate total expenditures for 1965 in Arizona for: cold water fishing, warm water fishing, salt water fishing, big game hunting, small game hunting, general hunting, waterfowl hunting. To appraise values, other than economic, associated with hunting and fishing and assemble significant recommendations for improvement of resources and facilities for hunting and fishing. To put into publication form the information secured.

Procedures: The survey will be conducted on a contract basis by Dr. William C. Davis, Professor of Marketing of the College of Public and Business Affairs of the University of Arizona, Tucson. The Game and Fish Department will pull names and address and mail questionnaires, following procedures outlined by Dr. Davis, with Dr. Davis and the University tabulating and analyzing the data and writing up the results. It is probable that a sample of nonrespondents will be contacted by personal interview; this will be accomplished by trained interviewers from the University. It is planned that the results will be published as a University Bulletin. This is considered to be desirable, since it is felt that the public will more readily accept the results in this form.

2.5

University of Arizona
Agricultural Experiment Station
Tucson, Arizona 85717

FOREST RECREATION DEMAND ANALYSIS

David A. King
Supported by *U.S.D.A., Forest Service*

Project Objectives:

A. Estimation of forest recreation demand relationships and development of recreational use forecasting models.

B. Development of better methods for evaluating forest recreation areas.

Description of Work Proposed:

Objective A: Studies aimed at improved definition of recreation products, starting with auto camping, will attempt to combine user and resource characteristics to develop a classification scheme reasonable to the user and the administrator. Eventually included will be user motives in addition to commonly measured socio-economic characteristics. Then the demand relationships will be studied to provide information for better projections of use.

Objective B: The travel-cost method will be used, with development of needed adaptations as part of the work to be done. This may include recognition of differing incomes, tastes, and opportunity costs of time among users.

2.6

Colorado Game, Fish and Parks Department
Denver, Colorado 80201

PARVIN LAKE QUALITY FISHING STUDIES

W. D. Klein
Supported by *State of Colorado*

The purposes of this study are to evaluate the influence of various special regulations and stocking rates on the trout, fishing and fishermen at Parvin Lake located in Larimer County at an elevation of 8,300 feet.

A 12-inch minimum size limit is now in force on rainbow trout, and stocking is at the rate of 65 rainbow fingerlings per surface acre in this 62-acre lake. The bag and possession limit is ten trout and bait fishing is prohibited. Fishermen must enter and leave the area via a check station. A card is made out for each fisherman each day that he fishes which includes his name, fishing license number, county or State of residence (if a non-resident), sex, time entering, time of departure, fish kept, fish released and fishing method. Detailed information on each fish kept is also entered on the card.

Inlet and outlet fish traps are operated which provide information on the movement of fish from the lake. Water chemistry, lake temperatures, stream temperatures and inflow water volume are recorded on a routine basis.

It is anticipated that various other special regulations, trout species and stocking rates will be tested in the future.

2.7

U.S. Department of Agriculture
Ft. Collins, Colorado 80521

OWNERSHIP AND MANAGEMENT ARRANGEMENTS FOR CONTROL AND USE OF RESOURCES IN THE WESTERN STATES

James A. Munger
Supported by *United States Department of Agriculture*

Object: To examine the nature, extent, and incidence of benefits and costs associated with the use of public resources in selected areas of the 11 Western States, and to explore ways of achieving a more effective use of all land resources in the West through alternative ownership and management arrangements.

Plan of Work: Contemporary economic theory relating to the distribution of costs and benefits required for efficient resource use will be evaluated. Available information on land ownership patterns, governmental organization, tenure practices and relevant statutes will be reviewed. With this background, an analytical model will be developed for measuring the ways in which dissociation of costs and returns affect the use and management of resources. Case studies will be made of actual conflicts between public and private interests, such as: public access to recreation areas across private lands; pressure to acquire private control of public lands valuable for recreation purposes; conflicting interests arising from multiple use of land. Alternative arrangements conducive to effective land use will be compared and evaluated. Special attention will be focused on institutional innovations for associating the benefits and costs of public investments.

2.8

The University of Connecticut
Agricultural Experiment Station
Storrs, Connecticut 06268

CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST

Walter C. McKain

Supported by *Cooperative State Experiment Station Services, U.S.D.A.*

Objectives: To identify and analyze those social, psychological and economic variables which motivate consumers to participate in outdoor recreational activities.

By means of library research and correspondence an inventory of relevant research and a classification of hikers will be developed. Mailed questionnaires and personal interviews will be used to obtain information regarding hikers and hiking clubs in New England (characteristics of members, areas of activity, etc.) On the basis of this information, hypotheses regarding the motivation of the participants will be set forth and tested by means of interviews in depth using such standardized measures as are applicable. The findings of this research will be utilized in the preparation of guidelines for the orderly development of hiking as a form of outdoor recreation in New England.

2.9

Cornell University
Agricultural Experiment Station
Ithaca, New York 14850

CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST

David J. Allee

Supported by *Cooperative State Experiment Station Services, U.S.D.A.*

Objectives: (1) To identify and analyze those social, psychological and economic variables which motivate consumers to participate in outdoor recreational activities. (2) To ascertain and evaluate consumer satisfaction with locational and environmental factors as they relate to consumption patterns. (3) To identify and analyze the reactions of participants to rules and regulations, physical facilities, social activities and off-site accessory attractants. (4) To identify and analyze the expenditures incurred by those who actively participate in outdoor recreational activities.

Procedure: (1) To participate in regional survey of hunters and fishermen, using a random sample of all resident license holders in New York. Regional uniform questionnaire to be used and standardized mailing methods. (2) To continue work on "Campers" subproject, publishing previous results, and participating in identification of market regions with other States and U. S. Forest Service.

2.10

University of Delaware
Agricultural Experiment Station
Newark, Delaware 19711

THE MEASURE OF DEMAND FOR OUTDOOR RECREATION FACILITIES IN THE PHILADELPHIA-BALTIMORE-WASHINGTON, D.C. METROPOLITAN REGION

Gerald L. Cole

Supported by *Cooperative State Research Service, U.S.D.A.*

Objectives:

1. To estimate the demand for outdoor recreation facilities by consumers in the Philadelphia-Baltimore-Washington, D. C. Metropolitan Region.
2. To measure the market potential for natural and human resources in agriculture as evidenced by the demand for outdoor recreation facilities in Delaware and the region.

3. To provide demand criteria which will aid public policy makers and public administrators in making decisions concerning the establishment of outdoor recreation facilities on farms in Delaware and the region.

Description of Work: A cross-sectional consumer survey will be made of about 2000 households in the Balto-Phila-Wash. metropolitan area. Data which will be obtained on socio-economic characteristics of families and their patterns of use of outdoor recreation facilities will be analyzed to derive demand equations which will be interjected in terms of their policy implications.

2.11

University of Delaware
Agricultural Experiment Station
Newark, Delaware 19711

CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST

Gerald L. Cole

Supported by *Cooperative State Experiment Station Services, U.S.D.A.*

Objectives: (1) To identify and analyze those social, psychological variables which motivate consumers to participate in outdoor recreational activities, (2) To ascertain and evaluate consumer satisfaction with locational and environmental factors as they relate to consumption patterns, (3) To identify and analyze the reactions of participants to rules and regulations, physical facilities, social activities and off-site accessory attractants, and (4) To identify and analyze the expenditures incurred by those who actively participate in outdoor recreational activities.

Description of Work Proposed: Copies of the camping questionnaire developed by the Regional Technical Committee will be administered by the hand-out technique to approximately 500 campers in Delaware's private and public campgrounds largely in coastal areas. Data from the questionnaires will be analyzed and incorporated into the regional study. Important comparisons include differences in characteristics of campers who seek areas near the ocean versus those who camp in a mountain environment.

2.12

Duke University
Durham, North Carolina 27706

HUMAN IMPACT ON VEGETATION IN GLACIER NATIONAL PARK

Ernest Hartley

Supported by *National Park Service, U.S.D.I.*

The research involves studies of the effects of visitors and man's activities in general on the alpine and subalpine vegetation. Extent of the damage, changes in flora, and vegetational relationships will be studied. Permanent exclosures and stations will be established for future observations.

2.13

Game and Fresh Water Fish Commission
Tallahassee, Florida 32302

SPORTSMAN'S OPINION SURVEY

F. K. Jones

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To measure and evaluate Statewide and sectional sportsmen's opinions.

Procedures: Opinion data collected under other job procedures, primarily Job 1-A, Mail Questionnaires, will be analyzed and evaluated. Particular interest will be placed on current controversial issues and on proposed or desirable regulatory changes. Opinion questions to be studied in the current segment are not yet determined.

2.14

Game and Fresh Water Fish Commission
Tallahassee, Florida 32302

HUNTER MOVEMENT

F. K. Jones

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To determine the county of residence of the hunters checked on the management areas.

Procedures: The random roadblock form used by hunt personnel to record the license numbers of hunters checked will be revised. The revised form will include date, license number, county of residence and management area or county in which checked. There will be increased emphasis on the use of this form on management areas. This system is similar to the hunter bag check and has the same bias as far as the sampling is concerned. However, it will be possible to state, "Of the hunters checked on .... (area), ...% were from ....(county or residence)".

Work Schedule: November to February

2.15

Florida Game and Fresh Water Fish Commission
Tallahassee, Florida 32302

RECREATION SITE USAGE

F. K. Jones

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: Measure the vehicular traffic at two public recreation sites in the Everglades Wildlife Management Area.

Procedure: Roadway traffic counters will be used to measure the vehicular traffic at the recreation sites. The counters will be read and recorded each Friday night and Monday morning. This will yield weekend and weekday counts.

Location of Work: Project Office, Saw Grass and Holiday Park Recreation Sites.

2.16

University of Florida
Gainesville, Florida 32601

MEASUREMENT OF THE AESTHETIC APPEAL OF MANAGED FOREST AND WILD LAND ROADSIDE ENVIRONMENTS

K. R. Swinford
Supported by *U.S.D.A., Forest Service*

Object: To develop procedures for the objective rating of the aesthetic response quality level of forest and other rural landscapes, and contribute to knowledge of human awareness of and reaction to prescribed modifications of roadside environments in managed forests and wild lands.

Plan of Work: The first phase will be the development of appropriate sets of slides and/or motion picture sequences for sampling user opinion of the aesthetic qualities of forest landscape. Phase 2 will sample the response of selected population groups to the filmed sequences. Data will be analyzed to determine the differences in response among social, economic, educational, and ethnic groupings. One or more of the population groups may be selected as a base observer group for further work to develop a continuum of forest and wild land aesthetically-rated scenery. The final phase will be an evaluation of various modifications of commercial forest harvesting operations and partial cuttings in buffer zones or screening strips along road right-of-ways from the standpoint of their amelioration of the aesthetically displeasing appearance of the usual cutover residual stand.

2.17

Institute of Community and Area Development
University of Georgia
Athens, Georgia 30601

DEMAND FACTORS FOR OUTDOOR RECREATION ACTIVITIES

James R. Champlin
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This study will consist of an analysis of present and future projected socio-economic characteristics of the Georgia population. Study will include: A. Population and Economic Characteristics, 1. Population Analysis and Projection, a. Characteristics of change 1940-1960, Total Population Figures by County, Urban-Rural Composition by County, b. Projected Change, in 5 Year Increments, 1960-1980 (to be related to economic section), Total Population Figures by County, Urban-Rural Composition by County; 2. Socio-Economic Characteristics 1960-1980, a. Age Composition, By County, Total Population Urban-Rural, Age Break for 10-11 year olds, b. Projected Income Characteristics 1960-1980 Per Capita Income, By County, Family Income, by County, Income Category Groups, by County, c. Educational Attainment, Persons over 25 years, Analysis and Projections by County, 1960-1980, Educational Groupings.

Plan of Procedure: Investigation will consist of analysis of primary library research data.

2.18

Institute of Community and Area Development
University of Georgia
Athens, Georgia 30601

DEMAND FACTORS FOR OUTDOOR RECREATION ACTIVITIES

James R. Champlin
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This study will consist of an analysis of (a) Employment by Major Occupation Groups, by County, Analysis and Projections, 1960-1980, Classification of Occupation Groups, (b) Employment by Major Industry Groups, by County, Analysis and Projections, 1960-1980, Classification of Industry Groups, (c) Average Work Week by County, Analysis and Projections, 1960-1980, Classification by Major Occupation and Major Industry Group; (1) Methodology will be explained and provided to the Planning Division in a Summary Report for the preceding work elements, (a) Analysis and projections of Population Change (relate to economic projections), (b) Analysis and Projections of Socio-Economic Characteristics, (1) Birth-Death, (2) Migratory Trends.

Plan of Procedure: Investigation will consist of analysis of primary library research data.

2.19

Institute of Community and Area Development
University of Georgia
Athens, Georgia 30601

RECREATION TRAVEL AND MOBILITY

James R. Champlin
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This section will analyze intrastate and interstate recreation travel of Georgia residents and out-of-state visitors. Present patterns of movement will be discussed by major travel corridors and between Outdoor Recreation Planning Regions. Study will include: (A) Characteristics of Recreation Travelers; (B) Variation in Day, Weekend and Vacation Trips; (C) Patterns of Intrastate Movement; (D) Time-Distance Analysis from SMSA's (E) Trends in Travel and Transportation.

Plan of Procedure: Investigation will consist of library research from past and present Georgia tourism studies. Studies have been based upon personal interviews with travelers through the State of Georgia.

2.20

University of Georgia
Athens, Georgia 30601

PRESENT DEMAND TRENDS

James R. Champlin

Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

Present user participation and preferences will be related to National and regional trends in outdoor recreation to arrive at future State participation characteristics. Study will include:

A. Analysis of Present Levels of Attendance.
  1. Location and magnitude of change in attendance at recreation areas in Georgia.
  2. Determination and analysis of use pressures at existing recreation areas.

B. Characteristics of Outdoor Recreation Users
  1. Socioeconomic Characteristics.
  2. Place of Residence.
  3. Frequency of participation.

C. User Participation and Preferences.
  1. Participation in Outdoor Recreation Activities.
  2. User attitudes and preferences at facilities.
  3. Attitudes of professionals in recreation.

D. Evaluation of National and Regional Trends in Outdoor Recreation.

Plan of Procedure: Investigation will consist of analysis of recreation user, visitation, and participation at Federal and State recreation facilities in Georgia. In addition, a personal interview survey will be conducted at selected recreation sites throughout the State.

2.21

University of Georgia
Agricultural Experiment Station
Athens, Georgia 30601

BIOLOGY AND CONTROL OF INSECTS IN OUTDOOR RECREATIONAL AREAS

R. T. Franklin

Supported by *Cooperative State Experiment Station, U.S.D.A.*

Objectives: (1) To determine the insect problems associated with outdoor recreational areas such as parks, picnic and camping areas, and farm fish ponds. (2) To study the biology and ecology of the major pests. (3) To develop practical control and/or prevention measures with special emphasis on source reduction and other methods with minimum hazards to wildlife.

The important problem insects in outdoor recreational areas will be determined by identifying the annoying insects present in such areas during the use season and by studying the relative discomfort caused by various species by personal exposure and interviews. Biological and ecological studies will be conducted in the field and laboratory. The important species will be reared in the laboratory to obtain detailed information on life histories. Field studies on seasonal occurrence will be made by standard sampling methods and other techniques to be developed. Environmental conditions contributing to the development of populations will be studied. The degree of natural control will be studied by field observations and laboratory rearing. Control measures will be developed by evaluating baits containing brood poisons or chemosterilants for social insects, repellants for area application, source reduction by chemical and mechanical habitat alteration, and area control with low-volume application of insecticide concentrates.

2.22

University of Georgia
Athens, Georgia 30601

PERFORMANCE TRAITS OF FOREST RECREATIONISTS: A BEHAVIORAL STUDY

William T. Moss

Supported by *State of Georgia*

Objectives:

1. To analyze behavioral patterns of forest recreationists in consideration of their cultural, social, educational, and economic backgrounds.
2. To develop recommendations for the adaptation of National and State forest facilities and services to better cope with the nature of the recreational users of the forest.
3. To recommend methods which would enhance the recreational usage of forest areas for both native and transient recreationists.

Procedures:

This study is directed to examine possible correlations among characteristics of the personal or family background and various manifestations of respect for the land. Analysis of recreational performance traits of forest users, along with background statistics, should provide information of value in planning for further development of forest facilities for recreational use and any modification of VIS programs and other State and local media to better educate the forest-using public. The ultimate aim of the study is the gathering of data which will allow the forest manager to understand, predict, and to some measure control the recreational usage of the forest.

2.23

Idaho Fish and Game Department
Boise, Idaho 83701

THE HARVEST OF SALMON AND STEELHEAD AS DETERMINED FROM SALMON AND STEELHEAD PERMITS

James F. Keating, Jr.
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:
To obtain estimates of the harvest of steelhead trout and chinook salmon from Idaho streams. To determine the fishing intensity for steelhead and salmon.

Procedures:
Records of the number of salmon and steelhead permits issued to vendors and subsequently to anglers will be recorded. All permits issued will be accounted for. A sample of approximately 8,000 permit holders will be obtained randomly from an IBM card deck of the approximate 45,000 anglers who will have received permits. After subtracting the voluntary returns (about 500), a request will be sent to the remaining permit holders in the sample asking that they return their salmon and steelhead permit in the enclosed envelope. Follow-up requests will be made until 85-90 percent of the sample has been accounted for. Data summaries will be prepared for the following groups of returned permits: (1) Those voluntarily returned; (2) Those returned as a result of the first request; (3) Those returned as a result of the second request, et. seq.; and (4) A combination of those in groups (2) and (3). From the data summaries and related information, the number of anglers, catch by stream and Statewide, and catch rate will be estimated and compared with catch estimates from other sources.

2.24

Idaho Fish and Game Department
Boise, Idaho 83701

A SURVEY OF FISHERMEN PARTICIPATION AND PREFERENCES

Ted C. Bjornn and James F. Keating
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:
To determine the background, types of fishing activity engaged in, and types of fishing activity preferred by Idaho resident and non-resident fishermen. To determine the fishing public's attitude and desires in regard to possible future goals in the management of the State's fishery resources.

Procedures:
Two groups of anglers who fish in Idaho will be surveyed: (1) A random sample of fishing licenses, both resident and non-resident, and (2) A selected group of influential anglers throughout the State who play an active role in molding public opinion on conservation issues.

Questionnaires will be designed to obtain information on the background of the angler groups, the types of fishing activities they participate in, the types of fishing activities they would prefer, and their opinions on possible goals in the future management of the fishery resources in Idaho.

The questionnaires will be designed to allow the use of electronic data processing equipment in tabulating and summarizing the data. Non-response follow-up will be undertaken.

2.25

University of Illinois
Champaign, Illinois 61820

RECREATION IN A CORRECTIONAL INSTITUTION

Alan R. Caskey
Supported by *University of Illinois*

The objectives of this study are:
(1) To assemble pertinent publications concerning recreation in a correctional institution.
(2) To analyze and evaluate these publications and publish extracts of pertinent findings.
(3) To sponsor and conduct research projects investigating recreation programs in correctional institutions.
(4) To develop and publish a series of operational guides for recreation professionals in the correctional field.
(5) To conduct research projects into the role of recreation in the prevention, control and treatment of youth and adult criminals.

2.26

Maine Department of Inland Fisheries and Game
State House
Augusta, Maine 04330

GAME KILL QUESTIONNAIRE

John D. Gill
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Annual measurement of the game kill by licensed hunters will be continued through a three-wave, post-card survey of about 11,000 licenses. A supplementary questionnaire to about 2000 licensees will obtain information on the costs of hunting for comparison with 1954 data.

2.27

Iowa State University of Science and Technology
Ames, Iowa 50010

COMPETITIVE RECREATIONAL USES OF SELECTED IOWA LAKES

Arnold O. Haugen
Supported by *Office of Water Resources Research, U.S.D.I.*

Much of today's recreation activity is water oriented, with clean water increasing in importance to outdoor recreation. Use even for recreational purposes is becoming so competitive that conflict in use is occurring. This study is designed to secure, organize and evaluate data on recreational uses of waters at Spirit, Okoboji, Clear, Eagle and Little Wall Lakes in Iowa with a view to formulating a management plan for recreational uses of these waters.

Uses (their degree of compatibility or conflict) to be studied include hunting, fishing, canoeing, sail boating, rowboating, swimming, scuba diving, water skiing, bird study, and for esthetic appreciation. The design of the investigation is to be on a statistically designed sample basis determined with the aid of the Statistical Laboratory at Iowa State University.

Basic data on such recreational uses should provide the information needed for some type of zoning by time or area and for establishing of a recreational use policy.

The study is to be conducted from September 1965 to June 1967.

2.28

University of Maryland
College Park, Maryland 20742

AN INVESTIGATION OF FACTORS AFFECTING THE INTENSITY OF USE OF WATER RECREATION FACILITIES

Donald J. Volk
Supported by *Office of Water Resources Research, U.S.D.I.*

The construction of new recreation facilities during the coming decades will require that careful attention be paid to their location if they are to be of maximum usefulness. Surprisingly little is known, however, about locational preferences of recreationists as reflected in their willingness to travel the distances necessary to make use of various types of recreation areas. This study is proposed to try to determine how far people are willing to travel to various types of recreation facilities, and to assess the importance of factors other than distance.

Data will be gathered on the place of residence of visitors to various recreation areas. Analysis of the data by multiple regression techniques will be undertaken to determine the effect not only of distance, but also of other social and economic factors such as income, urbanization, mobility, and the availability of competing facilities at comparable distances.

The study should be of value not only in estimating the potential demand for various proposed recreation areas, but also as a necessary preliminary step in some techniques for estimating recreation benefits.

2.29

Massachusetts Division of Fisheries and Game
Westboro, Massachusetts 01581

DETERMINATION OF DEER HUNTING PRESSURE IN MASSACHUSETTS

James McDonough
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

1. To determine the number of deer hunters.
2. To determine distribution of hunting pressure throughout the State.
3. To determine how far the average deer hunter throughout the State.
4. To determine how much time the average deer hunter spends hunting (daily and seasonal).
5. To determine what method the average hunter uses in hunting deer.
6. To determine other factors about the average deer hunter, such as age, number of successful years, preference for size or sex of deer, etc.
7. To determine if the following factors affect the average hunter: weather, wife and family, potential danger, finances, etc.
8. To determine the amount the average deer hunter spends for deer hunting.

Procedures:
The bulk of information will be obtained by using a postal survey on known deer hunters both successful and unsuccessful. Also, personal interviews will be made at checking stations.

2.30

Massachusetts Division of Fisheries and Game
Field Headquarters
Westboro, Massachusetts 01581

UTILIZATION OF WILDLIFE MANAGEMENT AREAS

George F. Pushee, Jr.

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

1. To determine the hunting pressure on wildlife management areas.
2. To determine multiple use of wildlife management areas by the general public.

Procedures:

1. Both roving and permanent checking stations will be used to determine the number of hunters. Counts will be made on days of peak usage. Cars will be counted to obtain a figure which can be multiplied by the average party size to give the final total of hunters. Whenever possible, hunters will be contacted to determine such facts as distance traveled to hunt, time spent on the area, hunting success, opinion of the area, etc. The above procedure will be satisfactory on the more popular areas which are regularly stocked with pheasants. On the more remote forest game areas, boxes will be erected containing report cards to be used on a voluntary basis for the collection of the above data.
2. Multiple use of management areas will be checked throughout the year other than during the hunting season. This will be accomplished by establishing a schedule of randomly selected days which will include both weekdays and weekends. In addition to an actual count, personal contacts will be made to determine the use, etc. On the remote areas, voluntary report stations will be established.

2.31

University of Massachusetts
Agricultural Experiment Station
Amherst, Massachusetts 01002

CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST

Robert S. Bond

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives: 1. To identify and analyze those social, psychological and economic variables which motivate consumers to participate in hunting and fishing.

2. To ascertain and evaluate consumer satisfaction with locational and environmental factors as they relate to consumption patterns.

3. To identify and analyze the reactions of participants to rules and regulations, physical facilities, social activities and off-site accessory attractants.

4. To identify and analyze expenditures incurred by those who actively participate in fishing and hunting activities.

Procedures: Using the procedures and questionnaires designed by the Regional Technical Committee, sample fishing and hunting license holders by mail to gather information to satisfy the objectives. Use a personal interview of respondents and non-respondents to obtain more depth and to verify mail data. Collect data so as to recognize ecological units of participation. Compare variables by analysis.

2.32

Michigan Department of Conservation
Lansing, Michigan 48924

HUNTER ATTITUDE SURVEYS

Lawrence A. Ryel

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To conduct mail and/or interview surveys to determine hunters' attitudes concerning various aspects of hunting.

Procedure: Obtain a statistically adequate sample of licensees from license application files, and obtain at least a 90 percent response rate by mail questionnaire or personal interview.

Relatively simple questions will probably be handled through mail contact while more complex situations can best be evaluated through personal interviews. In case of interview surveys, questionnaire designs and interviewer training will be accomplished in cooperation with a competent survey agency such as the Survey Research Center at the University of Michigan.

Activity on this job will depend on current need for such surveys, particularly in connection with any deer seasons. It is expected that a mail survey of about 1,200 deer hunters concerning opinions on the necessity of hunting antlerless deer, and what factors contribute to deer numbers, will be conducted. Additional deer hunter surveys may be needed depending on final deer hunting regulations. Samples of small game hunters may be interviewed to determine their preference for various types of seasons or regulations and their behavior in certain hunting situations.

2.33

Michigan Department of Conservation
Lansing, Michigan 48924

EVALUATION OF PUBLIC USE OF STATE GAME AREAS IN SOUTHERN MICHIGAN

C. T. Black
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To evaluate our progress in wildlife restoration on the State game areas in southern Michigan; to determine the extent of non-hunting use of these areas; and to determine what the Michigan public wants from these areas.

Procedures: Conduct sample bag checks by interview, postcards placed on parked automobiles, and sample counts of cars and hunters; compute game harvests, gun pressure, and hunter use; make sample counts of human use at other seasons of the year to determine non-hunting use; interview hunters and others to determine what they want and expect from such lands, and what brings them onto the State lands.

Location of Work: Rose Lake Wildlife Research Center.

2.34

University of Michigan
Ann Arbor, Michigan 48104

AN ANALYSIS OF THE FACTORS WHICH INFLUENCE THE LENGTH OF STAY OF CAMPERS IN THE WATERLOO RECREATION AREA OF MICHIGAN

Grant W. Sharpe and Daniel Talhelm
Supported by *University of Michigan*

A study of factors affecting who goes camping, their length of stay, and other information on the socioeconomic characteristics of campers.

A case study of a State recreation area in southern Michigan.

2.35

University of Michigan
Ann Arbor, Michigan 48104

ESTABLISHING AND DEVELOPING THE SELF-GUIDING TRAIL AS AN INTERPRETIVE MEDIA IN URBAN NATURAL AREAS

Grant W. Sharpe and Terry Sharik
Supported by *University of Michigan*

A case history of a 14-acre deciduous forest in Ann Arbor being spared from active recreation use through the establishment of an interpretive trail. Studies being performed on the design of the nature trail leaflet, wording, and visitor's learning ability.

2.36

University of Michigan
Ann Arbor, Michigan 48104

FACTORS INFLUENCING CAMPGROUND AND CAMPSITE SELECTION

Grant W. Sharpe and Gene P. Schaaf
Supported by *University of Michigan*

To determine the factors governing the reason or reasons why a camping family picks a particular site in a campground. The campground selected has a variety of sites on and back from a lake, in shade and in the open, near and removed from improvements. The campground selected seldom fills, offering the visitor a wide choice. Factors were correlated with equipment, travel distance, number and age of party members, etc.

2.37

University of Michigan
Ann Arbor, Michigan 48104

THE AWAKENING OF LEISURE

Grant W. Sharpe and Floyd Newby
Supported by *University of Michigan*

An historical analysis of changing leisure concepts through the Industrial Revolution in America. A case study of the United Auto Workers in Michigan and the sequential change of their concept of leisure.

2.38

University of Michigan
Ann Arbor, Michigan 48104

THE EFFECT OF MEMBERSHIP IN PRIVATE RECREATION CLUBS AND MEMBERSHIP USE OF PUBLIC RECREATION LANDS

Grant W. Sharpe and Alan Everson
Supported by *University of Michigan*

A study to determine the summer use of public recreation lands before and after membership in an outdoor recreation club. A case study of the membership of the Huron Valley Swim Club of Ann Arbor, Michigan.

2.39

University of Michigan
Ann Arbor, Michigan 48104

ANALYSIS OF FACTORS INFLUENCING ATTENDANCE AT FOREST RECREATION SITES

G. R. Gregory
Supported by *State of Michigan*

A study which intends to develop and test techniques for determining the relative importance attached to various features of forest recreation sites by users and to derive an "index of attractiveness" which will permit comparing the relative drawing power of such sites.

2.40

University of Missouri
Agricultural Experiment Station
Columbia, Missouri 65201

THE CARRYING CAPACITY OF DIFFERENT FOREST SITES FOR DIFFERENT RECREATIONAL USES

R. H. Westveld
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives:

A. To determine the effect of different kinds and intensities of recreational use in different types of forest stands on the soil.

B. To determine the effect of different kinds and intensities of recreational use in different types of forest stands on vegetation.

C. To determine the points at which recreational use of forest land causes a deterioration in the recreational value of an area and/or deterioration in other values (watershed, wildlife, etc.) of the recreational area and adjacent areas (based on results of A and B).

D. To establish standards of carrying capacity of different forest sites for different recreational uses (based on results of C). Objectives A and B will be carried out on small plots in different types of forest stands on several soil types under varying intensities of recreational use. Sites which have been used for recreation for an extended period and sites not now so used but which will be developed for use will be studied. Bulk density, pore volume, air capacity, field capacity, permanent wilting percentage, soil texture and infiltration capacity will be determined. Plants will be inventoried and the number of dead roots determined. Areas will be photographed periodically. Recreationists will be counted as a measure of use intensity. Objectives C and D will be developed from the results obtained under the first two objectives.

2.41

University of Missouri
Agricultural Experiment Station
Columbia, Missouri 65201

DEMAND OF THE METROPOLITAN POPULATION IN MISSOURI FOR OUTDOOR RECREATION FACILITIES IN RURAL AREAS

Durward Brewer
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

The objective of the research is to determine and identify the various demands for outdoor recreation with emphasis directed toward the marketability of farm resources and services. To determine and evaluate existing methods of sale and to develop alternative methods which utilize more completely the farm resource base for recreation purposes. To evaluate the factors which contribute to profitable merchandising of the use of rural farm areas relative to the leisure time-recreational demand pattern of the public.

Information will be obtained from urban population centers to determine the individual's participation in outdoor recreation and to facilitate the development of appropriate methods to determine the effects income, occupation, age, education, and other population characteristics have upon leisure time use. These factors will be used in determining space use intensity of various types of facilities in rural areas and measures will be made of the use intensity that would occur under varying conditions. These data will be correlated with secondary data on sales and services to determine the influential effects on present and potential demand for various types of recreational facilities located within given space context.

2.42

Montana Fish and Game Department
Missoula, Montana 59801

ROCK CREEK CREEL CENSUS-SUMMER CENSUS

Liter Spence
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The study is now in the ninth year of investigating the effects of introductions of catchable-sized hatchery-raised rainbow trout in Rock Creek. The first year, 1958, the project was studied under Job 2 of F-12-R-5. This is the eighth year under F-27-R. The objective of this job is to obtain data for estimating total fishing effort, total catch, species composition of the catch, and return to the creel of marked hatchery fish. These data will be used for an evaluation of the Rock Creek fishery both with and without plants of hatchery fish. Two checking stations are established, number one on the 16-mile upper section and number two on the 24-mile lower section. Signs are placed designating the dividing point of the two sections and the two checking stations. The checking stations will be operated as in the past years, on a full day basis (0900-2100) and about 50 percent of the days in the fishing season will be censused at both stations.

Traffic counters will be placed at each checking station. These hourly and daily car counts are used to estimate fishing pressure. The clerks at the checking stations obtain the following information from each angler: section fished; hours fished; total fish caught; species caught; marked fish caught; residency of angler and license number. As time permits, individual lengths and weights of the catch are recorded.

Summarization of data will be done by the Department's I.B.M. section. Statistical procedures are directed by the Department Statistician. Completed data will include estimated total fishing pressure, total catch of wild and hatchery fish, species composition in the catch, and catch per man hour and per angler.

Location: Rock Creek, Missoula and Granite counties.

2.43

Montana State University
Bozeman, Montana 59715

BASELINE STUDIES ON RECREATIONAL AREA: YELLOWTAIL RESERVOIR

John C. Wright
Supported by *National Park Service, U.S.D.I.*

This research is concerned primarily with the impact of concentrations of people on terrestrial and aquatic values. The studies will document ecological conditions of the proposed visitor use areas prior to the advent of such use. Recommendations concerning the management of the areas with regard to possible health hazards, contamination, pollution and changes in faunal and floral components of the area, will be developed.

Research being conducted in Bighorn Canyon Recreation Area.

2.44

University of Nevada
Reno, Nevada 89507

THE EFFECT OF QUALITY FACTORS ON THE DEMAND FOR WATER-BASED RECREATION

George A. Myles
Supported by *Office of Water Resources Research, U.S.D.I.*

This study is designed to:

1. Identify and define factors that constitute site quality.

a. Water quality: including temperature, clarity, dissolved solids, taste, odor, B.O.D., etc.

b. Man made facilities: dams, access roads to shoreline, boat ramps, and boat rental facilities.

c. Other physical and biological factors: relation of water to insects, location of sanitary facilities, sewage discharge so as not to contaminate swimming areas, and fishing.

d. Psychological factors: These include status seeking, effect of large numbers of people at the site, factors in a "prestige" location, and esthetic values derived at water sites.

2. Determine users willingness to pay for the above quality factors to establish priorities for site development.

3. Determine alternative methods of financing water-based recreation at other sites and evaluation of how satisfactory these methods have been.

a. By obtaining users' attitudes toward various financing methods such as gate charges or taxes.

b. By review of the literature to determine methods of financing water-based recreation at other sites and evaluation of how satisfactory these methods have been.

2.45

New Hampshire Fish & Game Department
Concord, New Hampshire 03301

HUNTER SURVEY AND BAG CHECK

Harold C. Lacaillade
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: Contact waterfowl hunters in the field for purposes of obtaining information on numbers and species of ducks bagged, hours spent hunting, crippling rate, and other pertinent information.

Procedure: Personnel of the Management and Research Division under the direction of the project leader will contact hunters on assigned days of the open season for waterfowl at designated sites throughout the State. Standardized forms for recording the data will be supplied to all personnel.

2.46

New Hampshire Fish & Game Department
Concord, New Hampshire 03301

MAIL QUESTIONNAIRE SURVEY (EVALUATION OF HUNTING AND FISHING DEMANDS)

Harold C. Lacaillade
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

It was *the purpose* of this study to: (1) determine the recreational status of New Hampshire's fish and game resources as related to demand; (2) attune research and management programs more closely to current and anticipated demands upon the State's fish and wildlife resources.

An appraisal of demands made upon wildlife species sought after by sportsmen in New Hampshire will be accomplished by measurement of the number of times in which resident and non-resident license holders hunted and fished for various species during a specified time period. Mail questionnaires sent to a random sample of license holders listed under one of several license categories will request information as to the number of times that sportsmen sought each of the various game and freshwater fish species which occurred in the state during 1964. Data received will authenticate not only which fish and game species provided the most sport to resident and non-resident enthusiasts but also which species contributed most to the economy of the Department and the State.

2.47

University of New Hampshire
Agricultural Experiment Station
Durham, New Hampshire 03824

CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives:

1. To identify and analyze those social, psychological and economic variables which motivate consumers to participate in outdoor recreational activities.

2. To ascertain and evaluate consumer satisfaction with locational and environmental factors as they relate to consumption patterns.

3. To identify and analyze the reactions of participants to rules and regulations, physical facilities, social activities and off-site accessory attractants.

4. To identify and analyze the expenditures incurred by those who actively participate in outdoor recreational activities.

Procedure:

Participants in camping will be surveyed, by mail questionnaire and personal interview, isolating those consumer attributes related to participation in camping. Samples of participants will be drawn and questionnaires structured so that relevant ecological units may be analyzed. Analysis of the generated data will obtain numerical magnitudes of the influence which the variables have on participation rates, consumption patterns, reactions, and expenditures.

2.48

New Jersey Division of Fish and Game
Box 1809
Trenton, New Jersey 08603

POSTCARD SURVEY

Robert E. Mangold

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To determine the numbers of deer hunters, both bow and arrow and firearm, together with an estimate of the percentage of successful hunters in each category.

Procedures: A postcard survey of approximately 5% of the number of firearm licensees will be sent out immediately following the end of the hunting season. An effort will be made to determine how many licensees hunted deer, how many were successful, and whether they hunted with bow and arrow or with shotgun.

Location of Work: Regional office, Nacote Creek, N.J.

2.49

New Jersey Division of Fish and Game
Box 1809
Trenton, New Jersey 08608

EVALUATION OF THE NUMBER OF HUNTERS AND OTHERS USING THE COLLIERS MILLS-SUCCESS LAKE RESTORATION AREA ON AN ANNUAL BASIS.

Frank Tourine, Jr.

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To show the utilization of the area by hunters and others on an annual basis. This study should show the effects of future State land development, both at Colliers Mills and the surrounding area, on the amount of utilization at Colliers Mills.

Procedure: Maintain traffic counters at the main entrance and the Turn Mill entrance to Colliers Mills. The average number of persons per vehicle used in the past is 2.3. Determine the annual utilization from January to January of the following year. On the first day of the duck season and the small game season, determine the number of hunters and their game harvest by a count at the main entrance and the Turn Mill entrance to Colliers Mills. The traffic counter data should be compiled on a monthly and seasonal basis and any annual trends indicated. Utilization fluctuations should be related to State land development at Colliers Mills and the surrounding area such as Greenwood-Pasadena, Whiting, Beckerville, Propsertown, and Assunpink Tracts.

2.50

New Jersey Division of Fish and Game
Box 1809
Trenton, New Jersey 08608

WATERFOWL PRODUCTION, UTILIZATION, AND HARVEST ON ARTIFICIALLY DEVELOPED AND NATURAL SALT MARSH AREAS

William Shoemaker

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To determine waterfowl production, utilization, and harvest on artificially developed shallow saline impoundments; and to collect comparable data from natural unmanaged areas.

Procedure: In an endeavor to determine local waterfowl production, early morning and/or evening observations will be conducted to determine total annual brood production on impounded salt marsh areas and on unmanaged natural control areas. In addition, early morning waterfowl utilization studies are to be conducted during spring and fall migration periods. Relative data are due to the impounding of coastal salt marsh areas. Bag checks will also be conducted on the opening day of the waterfowl hunting season at the impounded study area to determine hunter-utilization and harvest.

2.51

New Mexico Department of Game and Fish
State Capitol
Santa Fe, New Mexico 87501

CONSERVATION OFFICER CREEL CENSUS ON LAKES AND STREAMS

Paul Ferkovich and Warren J. McNall

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective:

Determine trends in catch rates and creel composition in individual waters, categories of waters, and Statewide.

Procedures:

1. To analyze creel census data collected by Conservation Officers on lakes and streams to help determine better stocking policies and allotments, fishing pressure, and catch per hour data Statewide and on individual waters.
2. To keep current approximate fishing pressure information by maintaining car counters in conjunction with Conservation Officer census data collections at several lakes previously covered by intensive creel census.

2.52

New Mexico Department of Game and Fish
State Capitol
Santa Fe, New Mexico 87501

COST HARVEST RATIO FROM SOUTHEASTERN NEW MEXICO WINTER TROUT WATERS

Warren J. McNall

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective:

To determine input (dollars) and output (angler recreation time and harvest) ratios from winter plants of catchable-size rainbow trout in warm-water environments managed as winter trout fisheries.

Procedures:

To determine the approximate fisherman use and harvest in winter managed trout waters in Southeastern New Mexico as related to the cost to plant rainbow trout in these waters.

This is the first year of a three-year project.

2.53

New Mexico Department of Game and Fish
State Capitol
Santa Fe, New Mexico 87501

STUDIES OF TEAL POPULATIONS IN NEW MEXICO

George W. Merril

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective:

To aid in the formulation of recommendations for waterfowl harvest regulations.

Segment Objective:

To participate with member States of the Central and Mississippi flyways, and the U.S. Bureau of Sport Fisheries and Wildlife, in a cooperative study of the effects on populations of teal and other waterfowl of a special September teal hunting season. More specifically, to determine:

1. Potential hunting pressure.
2. Hunter behavior patterns, with special emphasis on the possible illegal kill of waterfowl other than teal.
3. Hunting mortality exerted on populations of teal during the special early season.
4. Age and sex ratios of teal taken by hunters during the special hunting season.

Procedure:

1. Hunters will be required to apply for special Federal

teal hunting permits which will be furnished by the U.S. Bureau of Sport Fisheries and Wildlife and issued by the New Mexico Department of Game and Fish. These permits will be printed in duplicate so that a record of the names and addresses of all persons potentially hunting teal in New Mexico during the early season will be available for further contact.

2. Spy-blind studies (hunter observations) will be attempted during the special hunting season. Whenever possible the observations will be made without the hunters being aware that they are being observed. A record of the hunters' activity will be made on standard forms supplied by the Bureau of Sport Fisheries and Wildlife. Information recorded for each hunting party will include the following: number of hunters, dates and hours of hunting, number of shots fired, number of teal killed, number of teal crippled, number of illegal kills (attempted and actual), weather conditions, and any other related factors observed. Completed forms will be sent to the Migratory Bird Populations Station, Laurel, Maryland, for analysis along with comparable data obtained in other states.

3. Trapping and banding of teal (with main emphasis on bluewings) will again be attempted at stations located in the middle and lower Rio Grande Valley, and at lakes in the Northeastern part of the State. Tentatively, the banding stations used will be the same ones used in 1965 and 1966 so that comparable data may be obtained. These locations include the Bernardo and La Joya State Game Refuges, the Engle area, Salt Lake, Stubblefield Lake and other nearby lakes, and the Bosque del Apache and Bitter Lakes National Wildlife Refuges. All banding stations except those on the two National Wildlife Refuges will be operated by project personnel. Those on the National Wildlife Refuges will be operated by Federal personnel.

Salt Plains duck traps will be used in this work. Bait for the project-operated traps will be supplied by the project. Bait used in trapping on the National Wildlife Refuges will be furnished by the Federal Government at no cost to the project. Sorghum will be the bait used.

Preseason trapping will begin during the latter part of August if significant numbers of teal are available at the time and will continue until shortly before the opening date of the special teal hunting season. Post-season trapping will commence immediately following the close of the special season and will continue until the major populations of teal have left the trapping areas. An attempt will be made to band as many teal as possible during both pre- and post-season periods. Since band recovery rates on teal are normally very low, large samples are needed for securing a significant number of band recoveries.

Bandings will be made with U.S. Bureau of Sport Fisheries and Wildlife legbands. Banding schedules will be submitted to the Migratory Bird Populations Station, where the data will be analyzed along with that from other States participating in this study.

4. Wing collection envelopes will be mailed to a random sample of the teal hunting permit holders to obtain information on age and sex ratios in the hunter harvest. Envelopes will be supplied by the Bureau of Sport Fisheries and Wildlife, and postage on these envelopes to the central distribution point in the State will also be paid by that agency. Postage on the envelopes sent to individual hunters, and cost of addressing the packets, will be paid by the project.

Data collected will be forwarded to the Migratory Bird Populations Stations for analysis along with comparable data from other States.

2.54

New Mexico Department of Game and Fish
Santa Fe, New Mexico 87501

CREEL CENSUS AND USAGE STUDY OF CONCHAS LAKE

Ralph G. Little

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective:

1. Determine recreational use.
2. Determine fishing pressure.
3. Determine angler success.

Procedures:

1. a. Place vehicle counters across roads (4 counters) at Conchas Lake.

b. Make random visual observations at each counter to determine load factors and axles per unit for extrapolations to total usage.

c. Make weekly tours through parking, camping and recreation areas to determine origins of traffic from license plates (residents by county and non-residents by State).

d. Make random sample interviews in parking, camping and recreation areas to determine types of recreational activities to include (1) fishing, (2) boating, (3) swimming, (4) water skiing, and (5) picnicking and sightseeing. Duration of trip will also be determined.

2. From attendance counts, breakdown of activities, days per trip, and creel census interview data—determinations of man-trips, man-days, and man-hours per day of fishing will be determined.

a. The creel census form will be used.
b. Hours will be determined to the nearest quarter hour.
c. Average lengths and weights will be determined from measurements taken at random from fish in possession from every 10th angler.
d. Data to be obtained from compilation of angler contacts is as follows:
(1) Mean number of fish per angler when checked.
(2) Mean fishing time per angler when checked.
(3) Mean number of fish per angler-hour.
(4) Mean time fished per angler-day.
(5) Mean number of fish per angler-day.
(6) Mean number of fish per angler-trip.
(7) Mean weight of fish caught.
(8) Mean weight of fish per angler-day.
(9) Mean weight of fish per angler-trip.
(10) Percent of men, women, and children fishing from a boat and the mean number of each per boat. Percentages of bank and boat fishermen.
(11) Total number and weight of fish caught by month and for the duration of the creel census.
(12) Approximate total numbers and weights of each species caught during the creel census period.
(13) Percentages of total number and weight made up by each species per month during the creel census period.
(14) Baits, and combination of baits used and percent of each per month during creel census.
(15) Minimum and maximum length and weight of each species caught during the creel census period.

2.55

New Mexico Department of Game and Fish
Santa Fe, New Mexico 87501

CREEL CENSUS AND USAGE STUDIES ON UTE, LAKE VAN, AND CHICOSA LAKE

James S. Harrison
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: Determine recreational use, fishing pressure, and angler success of new waters.

Procedures: Creel censuses will be conducted at Ute Lake utilizing car counters and on-site interviews.

At Chicosa Lake and Lake Van procedures are different from Ute Lake as census data are available from special daily fishing permit stubs. Usage, other than fishing, is known to be insignificant at Chicosa Lake and is based on a commercial park establishment at Lake Van. Fishing pressure will be determined for all anglers 12 years of age or older by return of creel stub attached to a 50 cent permit sold at the concessionaire's stand for fishing privileges.

One day for each month alternating from weekday and week-end day will be spent checking anglers under 12 years of age to determine daily, monthly, and yearly percent in comparison to those over 12 years of age buying a fishing permit.

Determine length of fishing day from interview with anglers under 12 years of age not required to have permit.

Data to be obtained and compiled from return of creel census stubs and on-site interviews will include all usual indices of fishing pressure, catch, catch-per-unit of effort.

2.56

New Mexico State University
University, New Mexico 88130

RECREATION VALUES OF WATER IN THE MAJOR RESERVOIRS OF NEW MEXICO

James R. Gray
Supported by *Office of Water Resources Research, U.S.D.I.*

This work will be carried out on two large reservoirs where both recreation and irrigation are important in the operation of the reservoirs and where, from season to season, there is a wide fluctuation in the amount of water stored in the reservoir. Variations in precipitation as well as the major uses of the water tend to nearly deplete the water supply in the Elephant Butte Reservoir in the drought periods and therefore concentrate the recreation pressures on a relatively small surface.

The procedures are to determine the changes in recreational use of the two resources from one season to the next and to determine net economic values of the recreational resources on the Elephant Butte and Navajo reservoirs. The determinations will be made when water supplies are large and when they are relatively limited; demand schedules will be constructed based on transfer costs in early summer and late fall. Comparisons will then be made of the changes in demand schedules accountable by changes in reservoir levels. Computations will be made of demand elasticities of the three major groups of recreationists included in the study.

2.57

South Brooklyn Improvement Council
Room 1101, 210 Joralemon Street
Brooklyn, N.Y. 11201

SOUTH BROOKLYN YOUTH LEADERSHIP PROJECT

Susan Harwig

Supported by *Office of Juvenile Delinquency and Youth Development, HEW*

Inter-group tensions in South Brooklyn contribute to the increasing juvenile delinquency of the area. Youngsters reflect the ethnic hostilities of their parents in aggressive acts against members of an out-group. This project proposes to reduce juvenile delinquency by reducing inter-group conflict and in so doing, to improve inter-group relations. It plans to provide meaningful group activities (primarily recreational in the summer, developing into more extensive and community action oriented activities during the year) that cut across ethnic barriers and provide hitherto non-existent opportunities for inter-group contact. Thus, children in their natural groups will participate in inter-group activities.

The leaders of these activities will be selected from the informal leadership of the older teen-agers. They will be trained in both recreational and inter-group skills and paid for their work. Both their composition and their orientation will be inter-ethnic. The focus of the groups they lead, however, will be on the shared activities, and not on the improved inter-group relations that is the desired outcome. Activities will also be planned to involve the parents of the children and the peers of the leaders in inter-group experiences. It is hoped that such experience will provide the basis of cooperative endeavor among both adults and adolescents to improve and integrate their community.

The evaluation of the initial summer experiences will be in terms of inter-group contacts and consequences. The natural groupings will be described and observed for incidents and change (if any) as a result of interaction with members of other ethnic groups.

2.58

New York State Conservation Department
Oakdale, N.Y. 11769

SPORT FISHERY CATCH STATISTICS FOR TAUTOG

Philip T. Briggs

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

To obtain estimates of the catch and catch per effort of the sport fishery for tautog in Gardiners-Peconic Bays and adjacent areas as part of basic information for management recommendations.

There will be approximately 3,000 interviews of fishermen in Gardiners-Peconic Bays in the months of May through October. These field interviews will obtain information on the catch and catch per effort. In addition, information will be obtained in such a manner that estimates of the monthly catch statistics can be tabulated by the separate boat fisheries, e.g., private boat, rowboat, bank and pier, open and charter boat. Airplane counts of boats and fishermen will be made on 2 week days and 2 week-end days each month so that interview data can be expanded for monthly and total catch. The area encompassed by the study will be Gardiners-Peconic Bays, Horton Point to Great Gull Island in Long Island Sound and the region around Montauk Point. All data collected will be comparable with similar data recorded in F-15-R-10 and F-15-R-11.

2.59

New York State Conservation Department
Oakdale, N.Y. 11769

SPORT FISHERY CATCH STATISTICS FOR SCUP

Philip T. Briggs

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

To obtain estimates of the catch per effort of the sport fishery for scup in Gardiners-Peconic Bays as part of basic information for management recommendations.

There will be approximately 5,000 interviews of fishermen in Gardiners-Peconic Bays in the months of May through October. These field interviews will obtain information on catch and the catch per effort. In addition, information will be obtained in such a manner that estimates of the monthly catch statistics can be tabulated by the separate sport fisheries, e.g., private boat, rowboat, open boat and charter boat. Airplane counts of boats will be made on 2 week days and 2 week-end days each month so that interview data can be expanded for monthly and total catch. An inventory of sport fishing facilities in Gardiners-Peconic Bays will be completed in May. All data collected will be comparable with similar data recorded in F-15-R-10 and F-15-R-11.

2.60

Division of Fish and Game
Albany, New York 12224

BIG GAME HUNTING PRESSURE SURVEY

H. F. Maguire

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To sample 45,000 holders of big game and archery licenses to obtain information on deer hunters' days afield and success by areas hunted in. Related information has been collected on: (1) other licenses held by the big game and archery licensees; (2) location and number of dead deer seen while afield, and (3) the hunters' expenditures for deer hunting.

This survey was designed to provide reliable estimates of hunting days afield by counties, towns and river basins. All quantitative data will be expressed in terms of probability.

Procedures: The procedures are similar to those employed in the small game survey. All stages of the survey involving contact with the public were completed in Segment II. Data cards have been punched and the programming of the first phase of the tabulations was completed in February-March, 1967. The preparation of a punched card Post Office Master File showing counties, towns, and zones of licensees' residence and deer zones has been largely completed. This Master File is a prerequisite to transferring punched data card information onto computer tapes.

Tabulation and analysis of the collected data: Punched data cards have been prepared for each questionnaire returned by a gun licensee. Tabulations will be made by computer. Archery questionnaires will be manually tabulated in gross categories to provide information by three major zones only for licenses held, type land hunted on, success ratios and expenditures.

Tabulation of the first phase of the mailed questionnaire survey will be accomplished with computer by the Office of General Services.

Tabulations will consist of frequency distributions of data by waves and combinations of waves, on (1) day of month hunted; (2) number of days afield; (3) hours afield each day; (4) deer zones hunted in; (5) success by license and permit held. Each table also will show the hunter's origin by four major sources: resident of zone, non-resident of zone, city/suburban dweller, and out of State hunters.

Standard errors will be calculated by computer for each series of tabulated data to permit quick and statistically valid comparisons between waves, zones and license combinations.

Analysis of the data in Phase I, where the emphasis is on *deer,* will show the degree of precision that has been achieved in various estimates. These analyses will be used as the basis for planning tabulations and analyses to be prepared in Phase II.

Phase II tabulations, where the emphasis will be on *hunters,* will provide information on type land hunted on, carcasses seen, and expenditures by county and township. The breakdowns of data will be analyzed when Phase I is completed.

Although the precise percentage of returns will not be known until the 70,000+ data cards have been collated (computer operation) to remove duplicates, a manual count indicates a return of a little over 60 percent.

The nearly 40 percent non-response has made it imperative that an attempt be made to ascertain whether these nonresponders differ significantly from responders in percentage hunting, success ratios and days afield.

A telephone survey was undertaken to provide comparisons with the two strata (responders and nonresponders). Personal interviews would have been too costly and trained personnel were not available for such a survey, in any case.

A telephone survey of nonresponders in the Albany Metropolitan area was made by Research personnel to test the feasibility of conducting a Statewide survey. Response was encouraging and Management personnel conducted the Statewide survey during September-November 1966. Attempts were made to reach 1800 nonresponding licensees; approximately 600 were reached. A manual sample will not provide sufficient data for detailed comparisons with responders. If differences are found to exist, it is expected that they will be found in success ratios and possibly in rates of expenditures. The phone survey data will be adequate for major regional adjustments in these two categories.

Following analyses of the data provided by Phase I of the computer study, further consultations will be held with computer programmer(s) to plan the Phase II program. If this program can be completed during this segment, the final report will be written.

2.61

North Carolina State University
Raleigh, North Carolina 27607

CRITERIA FOR EVALUATING THE QUALITY OF WATER-BASED RECREATION FACILITIES

Charles C. Stott

Supported by *Office of Water Resources Research, U.S.D.I.*

Statement of Problem: On the basis of opinions of users of water-based recreation facilities and the opinions of professional recreation experts, rating standards will be established for quality of swimming, boating, and fishing. These standards will be used in evaluating the adequacy of facilities for at least one geographical area.

Objectives: To establish criteria of a practical nature that would aid in determining the quality of water-based recreation facilities; to develop standards for evaluation purposes; to develop standards that would serve as guidelines for the operators of water-based facilities.

Procedures: To determine existing practices relative to current standards; to determine from the user of water-based recreation facilities data essential to the adoption of criteria; to determine acceptable practices as performed by practitioners of good professional reputation. Major subjects: Marinas: boat docks, boat ramps, boat hoist, marine repair and services, boat mooring, boat anchoring, boat wet storage (boat slips), boat dry storage, floats, docks, piers, tackle shop and supplies, refreshment services, fishing bait, toilet, buoy safety markers; Swimming Areas: bathhouses, beaches, lifeguard staffing patterns, swimmer-lifeguard ratio, swimmer loads; Fishing Facilities: fishing piers, boat rentals, rescue squads. The data will be collected over an area of several States in the East during June, July, and August, 1965. Such data will be processed at North Carolina State University at Raleigh.

2.62

North Carolina Wildlife Resources Commission
Box 2919
Raleigh, North Carolina 27602

SPORT-FISHERY CREEL CENSUS, CURRITUCK SOUND

Thomas E. Crowell

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The objective of this job is to estimate the ultimate effects or habitat alteration upon angler fishing success and creel. A creel check will be maintained at the only public fishing access area on Currituck Sound (Coinjock) on Saturdays, Sundays, holidays, and one week-day each week between April 1 and October 31. The clerk will be on duty between 0800 hours and 2000 hours each day to examine each fisherman's catch (where permission is granted) at the conclusion of his trip. In addition to a scale sample, length and weight from each fish, the clerk will record the species primarily sought by the angler, the number of hours fished, type of bait, and the residence of the angler.

2.63

Northeastern Forest Experiment Station
Syracuse, New York 13210

COOPERATIVE FOREST RECREATION PROJECT WITH NEW YORK STATE COLLEGE OF FORESTRY

Elwood L. Shafer, Jr.

Supported by *U.S.D.A., Forest Service*

Object: To conduct cooperative research with Syracuse University on problems concerning planning, improving, protecting, and managing forest recreation; further, to stimulate greater interest of students at the graduate level in problems of forest recreation.

Plan of work: Investigations will be conducted on: (1) methods for projecting future recreation demands, including socio-economic characteristics of Adirondack campers; preference for recreational facilities in NE Pennsylvania State parks; use of colored slides for such measurement; preference for campsite design and facilities by use of architectural models; (2) soil and plant relationships, including fertilization and cover treatments to maintain vegetation on heavily used recreation areas; and alternatives of management for timber stands in areas of concentrated recreational use; (3) sociological aspects, including a secondary analysis of "on-site" questionnaire data collected in the Northeastern States; effect of creel catch and scenic surroundings on fisherman satisfaction and enjoyment; and methods of measuring nonmonetary values of outdoor recreation; and (4) financial respects, including evaluation of present criteria used for purchase or allocation of land for outdoor recreation; and of recreation use and trends for the purpose of predicting volume, place, and periods of future use of recreation space and facilities.

2.64

Ohio Division of Wildlife
Olentangy Wildlife Experiment Station, Route #1
Ashley, Ohio 58413

LEASED PUBLIC HUNTING AREA UTILIZATION BY PERMIT HOLDERS

Kenneth R. Russell

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

There are several tracts of land in Ohio owned by private industry which are available under administrative agreement as public hunting and fishing areas. Free permanent permits are issued to anyone requesting them as a partial measure of the use of these areas. However, it is not known how many of these permit recipients actually utilize the permits, how frequently and for what principal purposes.

The ultimate purpose of this study is to permit an accurate understanding of the role of industrial lands in providing hunting and fishing recreation in Ohio. The secondary purpose is to evaluate the potential of the telephone interview as a survey technique in Ohio's wildlife program.

A random sample of names will be drawn from the list of permit holders as of December 31, 1964. Each person selected will be subjected to a brief telephone interview by the local game protector. Questions posed during the interview will pertain to the frequency of use, seasons of use, purposes of use and hunting or fishing success experienced on the lands under study.

2.65

Ohio Division of Wildlife
Olentangy Wildlife Experiment Station
Ashley, Ohio 58413

PUBLIC HUNTING UTILIZATION SURVEY

Kenneth R. Russell

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The present uses of and needs for public hunting areas are not sufficiently known to permit evaluation of their present role in the Ohio hunting picture, nor planning for their future procurement, location and management. Quantitative data are needed to assess the effect of public hunting area management practices and to determine the need for their existence with particular reference to numbers, distributions, size, purpose and the hunter groups that they serve.

The objectives are to measure the utilization of public hunting areas in Ohio and establish why some hunters do and others do not use them.

Procedures:

Data will be collected from a randomly selected and statistically adequate sample of current hunting license buyers stratified by county according to average annual hunting license sales. A questionnaire will be mailed to the selected license buyers in late January 1965 and a total of three mailings will be made. The questionnaire will be designed to permit statistical analysis and to be psychologically objective.

2.66

Ohio Dept. of Natural Resources
Ohio Division of Wildlife, Fish Management Section
1800 Dublin Road
Columbus, Ohio 43212

ANALYSIS OF THE CHARACTERISTICS AND DISTRIBUTION OF THE OHIO FISHERMAN POPULATION

John N. Reis

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The objective is to determine the characteristics of the fishermen population in Ohio as a basis for sound administration of fish management programs and expenditures. This information is being obtained through a Fisherman Questionnaire mailed to one percent sample of Ohio resident anglers. The system consists of seven mailings, alternately with and without a questionnaire, to obtain as great a response as possible by mail. A personal interview follow-up will be made from a sample of non-respondents in order to evaluate this segment of the population. The questionnaire has been designed for processing by IBM Computer. Tabulation of the data will supply information such as angler age composition, utilization of fishing sites, species and seasonal preferences of anglers, and sociological aspects. Some relationships such as family size to desire for convenience, facilities fishing success to attitudes, and types of fishing water preferred to types utilized will be analyzed.

2.67

Ohio State University
Columbus, Ohio 43210

A SPATIAL ANALYSIS OF RECREATIONAL BOATING IN SELECTED AREAS OF OHIO

Barry Lentnek

Supported by *Ohio State University*

The primary goal is to evaluate the site and situational factors which influence boaters' decisions to attend specific recreational boating facilities. There are three basic elements to the research design. These are:

a. The influence of the location of recreational boating sites vis-a-vis the boaters' home locations in determining the choice of destinations for boating trips.

b. The inter-relationship of activity preferences of the boaters with the degree of specialization of recreational boating sites in specific boating activities and the inter-relationship between the background characteristics of the boaters and the activity preferences of the boaters.

c. The inter-relationships of activity preferences with perceptual and evaluative criteria employed by the boaters in judging the quality of sites for recreational boating activities.

Survey data concerning the variables indicated above were collected during the Summer of 1966. The data is now being analyzed. It is estimated that the project will be completed by January 1, 1968.

2.68

Oklahoma Department of Wildlife Conservation
Oklahoma City, Oklahoma 73105

EVALUATION OF UTILIZATION OF OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION LAKES FOR FISHING AND RECREATION

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:
To evaluate the utilization of Oklahoma Wildlife Conservation Department lakes for fishing and recreation.

Procedures:
1. Data collected under Segments 1 and 2 will be placed on punch cards and processed by machine methods.

2. Data will be analyzed to determine fishing pressure, yields, catch rates, composition of the catch, characteristics of the fishery and the ratio of fishing to other recreational activities at the lakes.

3. A final report will be written and published in the Proceedings of the Southeastern Association of Game and Fish Commissioners, or other suitable publications.

4. Brochures on each lake will be written for distribution to the public, using data from this job and job 3. Brochures will include a topographic map developed under a State project.

2.69

Oklahoma Department of Wildlife Conservation
State Capitol
Oklahoma City, Oklahoma 73105

EVALUATION OF UTILIZATION OF OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION LAKES FOR FISHING AND RECREATION

Leland E. Roberts
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

PPS Objective:
To evaluate the utilization of Oklahoma Department of Wildlife Conservation lakes for fishing and recreation.

Segment Objective:
To evaluate the utilization of Oklahoma Wildlife Conservation Department lakes for fishing and recreation.

Procedures:
1. A statistically reliable creel survey was developed (forwarded to Regional Office, November 1964) and has been in operation at Department lakes since December 1964. Data will continue to be taken through December 1965, to furnish information on fishing pressure, yields, catch rates, composition of the catch, characteristics of the fishery, and the ratio of fishing to other recreational activities at the lake; 2. The creel survey data will be placed on punch cards and processed by machine methods and/or computors; 3. Field forms and data processing forms and techniques are designed together to insure efficient data processing and analysis. Calculations will be similar to that given by Lambou (1959); 4. Access to the Department lakes is provided at one to three points per lake. One part-time creel checker will be employed for each lake. Creel survey road blocks will be conducted during one morning and one evening period during the weekdays, and one morning and one evening period during the weekend and holidays. These periods are chosen by a random design.

Location of Work: Lake Hall, Jap Beaver Lake (Waurika Lake), Louis Burtschi Lake, Lake Nanih Waiya, Lake Ozzie Cobb, Schooler Lake, Lake Vincent, Lake Watonga, Lake Elmer (Kingfisher Co. Lake), Lake Carl Etling, Lake Schultz, Dahlgren Lake.

2.70

Oklahoma Department of Wildlife Conservation
Oklahoma City, Oklahoma 73105

UPLAND GAME INVESTIGATIONS—FORT COBB CROW STUDY

Paul Mace

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:

To measure the recreation and economics associated with the Fort Cobb Crow Roost population.

Procedure:

I-II. Random Field Survey:

A. A map of the Fort Cobb Lake Area will be studied and all farm residents within a 20-mile radius of the roost will be interviewed and made aware of the study.

B. The actual hunter survey will be conducted during fall and winter.

C. Hunters will be interviewed in the field, cafes, motels or anywhere that the opportunity is afforded.

D. Interviews will be conducted during the period of October 8 — February 28, 1967.

E. Data for each segment job completion report on the hunter Sample Survey will contain the following:

1. Total resident hunters at the Fort Cobb Crow Roost as determined by the data processing hunter survey (W32R).
2. Total non-resident hunters.
3. Total crows killed.
4. Average hours hunted per hunter in field.
5. Different types of hunting.
6. Average expenditures per hunter.
7. A chart breakdown of hunting pressure.
8. A graph showing buildup, peak and decline.

III. Distribution.

IV. Flyway Time-Count census will be made.

V. Peanut Depredation.

2.71

Oklahoma State University
Stillwater, Oklahoma 74074

DEMAND FOR RECREATION IN THE WILDHORSE CREEK WATERSHED

Daniel D. Badger

Supported by *Oklahoma State University*

Rising incomes, more leisure time and shifts in population have combined to increase the demand for Oklahoma land and water resources for recreation. Many facilities being used for recreational purposes were developed primarily for other uses, such as flood control and conservation, or for municipal water supplies, but there is increasing interest in providing recreational facilities as part of these projects. Economic models and methodological procedures will be developed for recreation demand analysis in the Wildhorse Creek Watershed near Duncan, Oklahoma. Data will be assembled on population, miles traveled, money spent, income, hours worked and other variables needed to estimate the demand for outdoor recreation in the selected area. Tourist surveys, city records and published data will be used as source material. A sample of the users of the facilities in the area will be surveyed by questionnaire structured to obtain information on the projected use of all facilities. These will be analyzed by several of the best developed techniques to derive effective demand schedules for the recreational facilities in the area.

2.72

Public Service Commission
Ottawa, Ontario, Canada

LEISURE TIME ATTITUDES AND ACTIVITIES OF INDUSTRIAL WORKERS

Hanns W. Lungstrass

Supported by *Public Service Commission-Canada*

The project under-way is designed to ascertain the leisure time attitudes and activities of a sample (158) of industrial workers in the oil and chemical industry in and around Edmonton, Alberta, Canada. The research has been completed except for the writing of the final report.

2.73

Oregon State University
Corvallis, Oregon 97331

SURVEY OF EFFORT AND SUCCESS BY OREGON ANGLERS

Lyle D. Calvin

Supported by *State of Oregon*

Objectives:

To estimate the number of angler days and fish caught by Oregon anglers during 1965 for each species of fish in each area of the State.

Progress to Date:

Sampling has been completed which involved 20,000 phone calls to persons whose names were drawn from

Oregon telephone directories, and 3,500 questionnaires to out-of-State anglers.

Preliminary reports have been completed showing the amount and location of fishing effort by area of residence, type of fishing, location of fishing and month. A final report is in preparation.

2.74

Pennsylvania State University
Agricultural Experiment Station
University Park, Pennsylvania 16802

RURAL LAND USAGE

R. A. Bartoo
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Develop the framework for a research program to investigate the problems of rural land usage. Devise methods and select criteria for measuring the economic and social values which can be attached to alternative uses of rural land. Devise methods of measuring the compatibility of rural land uses so that the relative desirability of proposals for single use or combination of uses may be evaluated. Continued emphasis will be placed on recreation development with particular reference to water and wildlife resources.

2.75

Pennsylvania State University
Agricultural Experiment Station
University Park, Pennsylvania 16802

THE DEMAND STRUCTURE FOR RURAL RECREATION

James H. Copp
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

1. To investigate the public's structure of preferences and motivations in the use of leisure time.
2. To estimate the relative demand to be expected for the various kinds of recreation which can be provided in rural areas.

A random cluster sample of at least 1,200 rural and urban adults in a metropolitan county in Pennsylvania will be personally interviewed in order to determine patterns of leisure time activities and interests. In addition, information on attitudes, background characteristics, disposable time, equipment, and accessibility will be collected. These data will permit the delineation of the present demand structure, the inference of underlying motivations, and the estimation of future requirements for those kinds of recreation which can be provided in rural areas.

2.76

Pennsylvania State University
Agricultural Experiment Station
University Park, Pennsylvania 16802

CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST

M. E. John
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

1. To identify variables influencing participation in outdoor recreation activities.
2. To ascertain the relationship of locational and environmental factors to consumptic patterns.
3. To analyze consumer response to the particular nature of the facilities, including accessory attractants.
4. To analyze expenditures incurred by consumers in outdoor recreation activities.

Pennsylvania will cooperate with five other Northeastern States in following the above objectives for the activities of hunting and fishing. A mailed questionnaire will be developed and sent to a random sample of about 2,000 license holders. Follow-up procedures will be developed to reduce nonresponse bias. The data to be analyzed will consist of personal attributes, attitudes, and activity patterns followed in hunting and fishing.

2.77

University of Rhode Island
Agricultural Experiment Station
Kingston, Rhode Island 02881

CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST

Charles Gratto
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives:

1. To identify and analyze those social, psychological and economic variables which motivate consumers to participate in outdoor recreational activities.
2. To ascertain and evaluate consumer satisfaction with locational and environmental factors as they relate to consumption patterns.
3. To identify and analyze the reactions of participants to rules and regulations, physical facilities, social activities and offsite accessory attractants.
4. To identify and analyze the expenditures incurred by those who actively participate in outdoor recreation activities.

Procedure:
This study will focus on one activity, camping in public and private campgrounds. The unit of observation is the party (family, group, individual, etc.) using camp-sites in Rhode Island campgrounds. The population is the camp-site users who occupy sites in Rhode Island campgrounds for one or more nights during the 1965 season. Analysis will be based on data obtained from a systematic sample of users. Both on-site interviews and mailed questionnaires will be employed. Data will be obtained on camping activity, social and economic characteristics of participants, expenditures, attitudes toward the site, the campground and the area, attitudes toward the rules and regulations under which the campground is operated, and opinions regarding camping facilities wanted and the pricing of such facilities. Standard statistical techniques will be used in analysis of the data.

2.78

San Jose State College
San Jose, California 95110

THE EFFECTS OF HUMAN IMPACT ON *SEQUOIA GIGANTEA*

Richard J. Hartesveldt
Supported by *National Park Service, U.S.D.I.*

The investigation involves a series of studies designed to establish the successional significance of the dense stands of fir, cedar and a heavy understory of brush which have invaded sequoia groves. Attempts are being made to determine if such invasion and the accumulation of thick forest duff is a natural development or is the consequence of man's fire control practices. Finally, the investigators are seeking to determine the influence of such invasion and litter accumulation on reproduction and establishment of *Sequoia gigantea.*

The studies are being undertaken in Sequoia-Kings Canyon National Parks.

2.79

Museum of History and Technology
Smithsonian Institution
Washington, D. C. 20560

STUDY OF THE POSSIBILITIES AND PROBLEMS IN CREATING LIVING HISTORICAL FARMS

John T. Schlebecker
Supported by *Resources for the Future, Inc.*

The United States is rapidly becoming a highly urbanized Nation, but it has a rich agricultural history, which should not be lost, but rather be made more readily accessible to urban dwellers. A proposal has been made to establish a number of living historical farms in the United States — farms which would approximate, reasonably closely, actual operating farms typical of some important regions and historical eras. A number of open-air museums, presenting some aspect of rural and small town living, exist; but these proposed farms would be somewhat different, with major emphasis on actual operations. As such, they would have educational, cultural, and entertainment value to many persons. Numerous problems would arise in creation and operation of such farms. The general purpose of this project is to make a preliminary study of this idea, to determine if the project is feasible, to identify the major problems that would arise, to establish some criteria for selection of sites and historical periods, and to make some preliminary estimates of costs.

Specific Aims and Expected Results:
This inquiry would begin with a review of relevant literature, and would include extended visits to a number of areas in the United States, and probably also to some in Europe. Through questionnaires and letters, an attempt will be made to estimate probable public interest in such living historical farms. Some possible sites for such farms will be visited. The advice of various specialists, in the organization and operation of such farms, will be sought. An advisory group representing various Bureaus in the Departments of the Interior and Agriculture now exists and will be utilized.

The project is expected to result in two publications that will illustrate the idea and present a basis for possible public action in the establishment of such farms. At least one attractive brochure, for semi-popular use, is planned. These will be published by the Smithsonian Institution.

2.80

South Dakota Department of Game, Fish and Parks
Pierre, South Dakota 57501

CREEL CENSUS, FISHING PRESSURE ESTIMATE AND ECONOMIC SURVEY ON TROUT WATERS IN THE BLACK HILLS OF SOUTH DAKOTA, 1967

Lloyd F. Thompson
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To evaluate the current trout stocking program and its relationship to the local economy.

Procedures: Data related to the objectives is to be collected on selected sections of Spearfish Creek from Savoy upstream to include sections currently stocked with hatchery trout. Similar data is to be collected on

Center Lake, Grace Coolidge Creek and Legion Lake. The creel census will be conducted 24 days of a 112-day summer period, from May 22, 1967 through September 10, 1967. The period will be of four 28-day segments. Six days are to be selected within each segment to include two weekdays, two Saturdays and two Sundays or one Sunday and one holiday.

This selection of sample days involves 20 percent of the total period. The data collected and subsequent calculations will be patterned after the "Minnesota System" and expanded as described in F-1-R-11, Job 16. The information gained is expected to be compatible with that of D-J, F-1-R-8, Job 7 but somewhat more reliable due to a doubling of the sample size.

The census days for the two separate areas were picked at random from tables of random numbers. A copy of the questionnaire has been submitted, the economic portion of which is subject to modification by the Business Research Bureau at the University of South Dakota.

On each census day counts of anglers will be made at two-hour intervals beginning at 5:30 a.m. and ending following the 7:30 p.m. count. Following each count anglers will be interviewed by the clerks, as many contacts as possible being made prior to but not to interfere with the next scheduled count.

2.81

Denver Wildlife Research Center, U.S.D.I.
P. O. Box 2570
Asheville, North Carolina 22802

BIG GAME HUNTERS, HUNTING ACTIVITIES AND FOREST ACCESS IN NORTH CAROLINA

Robert L. Downing
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: (1) To determine the movements and distribution of big game hunters in relation to forest access in North Carolina. (2) To determine relations between social characteristics of hunters, use of access, nature of hunting activities, and hunting success.

Procedures: This is a cooperative study between the Southeastern Forest Experiment Station, USFS, The Bureau of Sport Fisheries and Wildlife, and the N. Carolina Wildlife Resources Commission.

Hunters were systematically sampled during 2 deer hunting seasons (1964 and 1965) as they left 5 selected big game management areas in North Carolina. The day's walking and vehicle-driving activities of each hunter were traced on local maps and deer kills by successful hunters were located. Social characteristics of each hunter were obtained by interviews. Analysis of results is being performed by the U. S. Forest Service. The Bureau of Sport Fisheries & Wildlife participated in planning the study and collection of data.

2.82

Denver Wildlife Research Center, U.S.D.I.
Asheville, North Carolina 22802

SMALL GAME HUNTERS, HUNTING ACTIVITIES AND FOREST ACCESS IN NORTH CAROLINA

Robert L. Downing
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: (1) To determine the movements and distribution of small game hunters in relation to forest access in North Carolina. (2) To determine relations between social characteristics of hunters, use of access, nature of hunting activities, and hunting success.

Procedures: This is a cooperative study between the Southeastern Forest Experiment Station, USFS, the Bureau of Sport Fisheries & Wildlife, and the N. Carolina Wildlife Resources Commission.

Hunters were sytematically sampled during 2 hunting seasons (1964 and 1965) as they were left 5 selected game management areas in North Carolina. The day's walking and vehicle-driving activities of each hunter were traced on local maps. Social characteristics of each hunter were obtained by interviews.

Analysis of results is being performed by the U. S. Forest Service. The Bureau of Sport Fisheries & Wildlife participated in planning the study and collection of data.

2.83

Syracuse University
State University College of Forestry
Syracuse, New York 13210

A STUDY OF THE MAGNITUDE AND EFFECTS OF SITE DETERIORATION AND TRAIL EROSION INDUCED BY RECREATIONISTS IN THE HIGH-PEAK REGION OF THE ADIRONDACK MOUNTAINS OF NEW YORK

E. H. Ketchledge
Supported by *Forest Service, U.S.D.A.*

Objective: To provide the basic ecological information and understanding necessary for multiple-use management decisions involving the unusual vegetational types existing on and near mountain summits in the Northeastern United States.

The reconnaissance and inventory phase of the study was initiated in July-August, 1966. Thirty peaks were visited; on each observations were made, photographs taken, and reports prepared on severity of damage along high mountain trails and in the alpine summit zone above timberline. Six study areas, 4 at or above timberline and 2 below, were selected for vegetational-ecological analysis in 1967. Two new high-country trails are being studied for erosional processes .

Certain erosion-control techniques and vegetation rehabilitation trials will be run on the test plots. The vegetation ecological analyses will be conducted on the permanent study plots.

2.84

Tennessee Game and Fish Commission
Nashville, Tennessee 37202

CREEL CENSUS AND ECONOMIC SURVEY

James D. Little
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To determine the:
(1) Fishing pressure, catch per hour, and total catch in the seven-mile Dale Hollow Tailwater.
(2) Economic value of the fishery.

Procedure: A creel census designed and recommended by Dr. Don Hayne, Institute of Statistics, North Carolina State College, titled "Sampling with Probability Proportional to Size," will be used. One creel clerk will collect and record information from fishermen five days per week on a year-round basis. Each day, the clerk will make a total pressure count at a random pre-selected time, and spend the remainder of the day contacting fishermen. Data collected will include number and weight of fish by species, number of hours fished, methods of fishing, etc. Economic information pertaining to expenditures by fishermen will be collected from approximately 10 percent of the fishermen contacted.

Location of Work: Dale Hollow Tailwater and Office, Cookeville, Tennessee.

2.85

University of Tennessee
Agricultural Experiment Station
Knoxville, Tennessee 37916

THE DEMAND FOR OUTDOOR RECREATION IN TENNESSEE

Joe A. Martin
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objective: To determine and describe the unmet demand for specific kinds of outdoor recreation opportunities in Tennessee.

Procedures: Surveys of users and potential users of outdoor recreation facilities will be conducted to determine: (1) the need or desire for additional facilities; (2) what services do users want provided in association with various types of recreation facilities; (3) how much people would be willing to pay for various types of recreation services; (4) how far people would travel to use various types of recreation facilities.

Data for the study will be secured by personal interview with: (1) a sample of urban population stratified by income, occupation and race, and (2) a random sample of population in selected rural areas. Supplementary data will be obtained by a mail questionnaire to a sample drawn from the membership rolls of outdoor recreation groups.

2.86

Travel Research International, Inc.
405 Lexington Avenue
New York, New York 10017

NATIONAL TRAVEL TRENDS QUARTERLY INDEX

Robert A. Peattie, Jr.
No Formal Support

The NATIONAL TRAVEL TRENDS QUARTERLY INDEX is the first and only continuing survey of the total National travel market. Based on 2500 new interviews with adults every month — 7500 every quarter, 30,000 every year selected Nationwide on a probability sampling basis — the Index provides thousands of units of valuable information from which selected items, or combinations of facts can be tabulated, analyzed and reported monthly, quarterly, semi-annually or annually to fit the special needs of any company or organization serving the travel market. Comprehensive questionnaires are used to cover the entire range of vacation and business travel in terms of characteristics of travelers and non-travelers, nature of trips, modes of transportation, destination, trip frequency, size of traveling group, travel intentions and plans, media habits (reading, listening and viewing), recreational activities and many other facets of the constantly expanding travel complex. One of the main features of the index is Forecast of Future Travel Activity, including where people plan to go, both domestically and abroad, by States and foreign countries; when they plan to go; and how they plan to get there. The forecast provides this information sufficiently in advance of the time these travel plans are to materialize so as to allow preparation of advertising and sales promotion campaigns by any company serving one or more segments of the travel market.

The NTTQI is a TRI service available to any organization in the travel, transportation or recreation industry. Confidential Index Reports to each client are tailored to his specific needs and particular requirements. Covers years 1965 and 1966.

2.87

Bureau of Outdoor Recreation
Department of the Interior
Washington, D. C. 20240

THE 1965 NATIONAL RECREATION SURVEY

Charles C. Morrison, Jr.

Supported by: *Bureau of Outdoor Recreation, U.S.D.I.*

The 1965 National Recreation Survey was conducted by the Bureau of the Census during the first two weeks of September 1965. The approximately 8,000 sample persons who were interviewed in their homes in 333 primary sampling units throughout the country were selected from a group that had been rotated from the sample used for the August Current Population Survey. The purposes of the survey were similar to those of the 1960-1961 National Recreation Survey, the results of which appear in Study Report 19 of the Outdoor Recreation Resources Review Commission. In 1965, however, participation in various outdoor recreation activities was measured (in "activity day" units) primarily with reference to vacations, other overnight recreation trips, and outings taken in the three summer months whereas in 1960-1961 the survey was repeated four times, to cover each quarter of the year, but with a sample of only 4,000 persons each time. The 1965 interview schedule included questions on activity preferences and facility constraints. And it did achieve a rough measure of fall, winter, and spring participation that should provide some basis for trend evaluation. A major departure from the earlier format involved the elimination of trip expenditure questions and of the section of the schedule that dealt with leisure time; it was felt that this information should be developed through other surveys in which better techniques, requiring more interview time, could be used. All participation, trip, and preference results will be cross-tabulated against various socioeconomic characteristics of each respondent; this will provide a basis for determining the nature of the influence of these characteristics on variations in data intensity.

2.89

Utah State Department of Fish and Game
Salt Lake City, Utah 84101

1967 FISH HARVEST INVENTORY

Arnold Bangerter

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To formulate fish harvest recommendations.

Status: This is the first year of an annual survey.

Justification: Annually collected fish harvest and fisherman-day-use data will provide a factual basis for fishery management recommendations.

Procedures: During January of each year, or as soon as possible thereafter, a notice will be sent to a four percent sample of randomly selected fishermen who purchased a combination of fishing license in 1966. The notice will advise participants to record the number of trips afield, the number of days fished on lakes and reservoirs, and the number of cold water or warm water fish captured for the purpose of completing a questionnaire which will be mailed to them in December.

Data supplied by respondents will be tabulated by machine and correlated to the total license sales of the same year.

2.90

Utah State University
Utah Center for Water Resources Research
Logan, Utah 84321

CULTURAL, SOCIAL ORGANIZATIONAL, AND SOCIAL PSYCHOLOGICAL FACTORS ASSOCIATED WITH PROPOSED CHANGES IN WATER USE PATTERNS

H. Bruce Bylund

Supported by *Office of Water Resources Research, U.S.D.I.*

The study will be made in a selected area having wild land and recreational pressures as well as pressures toward urbanization and agricultural development where water development is being proposed. Historical information will be obtained from secondary sources, on the religious, political, legal and economic history of the area, which will give insight into the value system and cultural patterns which may have a bearing on the present situation. Economic, political, agricultural, and voluntary organizations with an interest in the proposed change will be studied. This data will be obtained both from secondary sources and from interviews with key informants in the area. These interviews will also be used as a means of determining the major variables involved and will be used as the basis for refining a field study of attitudes and opinions related to the proposed change. An attempt will be made to determine the various advocates and opponents of the idea, their motivations, and the strategies they used in attempting to influence the situation.

2.91

Utah State University
Logan, Utah 84321

CONSUMER DECISIONS AFFECTING VACATION PATTERNS

John D. Hunt
Supported by *State of Utah*

Objectives:

1. To determine what factors influence tourists' vacation decisions.
2. To relate effectiveness of promotion media, distribution and timing to the factors influencing vacation decisions.

The sample of interviewees has been stratified to determine differences between (1) People engaged in different kinds of recreation activities, (2) Tourists in different geographic regions of the State, and (3) The people touring and recreating at different seasons of the year.

Five broad types of information are sought:

a. Making of vacation decisions — How, When, By Whom.
b. Motivation behind vacation decisions.
c. Current role of promotion material in vacation decisions.
d. Vacation profile.
e. Tourist characteristics.

2.92

University of Vermont
Burlington, Vermont 05401

CONSUMER ANALYSIS OF SELECTED FOREST-ORIENTED RECREATIONAL ACTIVITIES

Malcolm I. Bevins
Supported by *University of Vermont*

Objective: The primary objective of the project is to identify and analyze social motivations, attitudes, and economic factors which move consumers to participate in specific forest-oriented recreational activities. The secondary objectives of the project include:

1. To ascertain and evaluate consumers' satisfaction with locational and environmental factors and relate this to consumption patterns.
2. To identify and analyze the reactions of participants to regulations, physical facilities, entertainment programs, and off-site attractions.
3. To identify and analyze expenditures incurred by participants in outdoor recreational activities.

Participants in a selected activity (such as hunting or fishing) will be surveyed by a mail questionnaire, personal interview, or controlled observation (as is deemed most appropriate), in an attempt to isolate those consumer attributes related to participation in that activity. Vermont's contribution to the regional project will be designed to obtain information on hunting and fishing in the State of Vermont. Marketing areas will be identified and samples of participants will be drawn from these areas. Analysis of data will yield information on magnitudes of influence which variables have on participation rates and patterns.

2.93

Waterloo Lutheran University
Waterloo, Ontario, Canada

THE MAN-LAND RELATIONSHIP WHEN DRIVING FOR PLEASURE IN WATERLOO COUNTY

George Burton Priddle
Supported by *Department of Energy Mines and Resources (Canada)*

The main purpose of the study is to acquire greater insight into the recreational activity of driving for pleasure. In terms of participation this is the most popular form of outdoor recreation. Knowledge or motivation for the activity and of the decision-making involved in route selection will be sought. This is a microgeographic analysis involving field work on the aesthetics of landscape through utilizing existing classification systems and applying a series of perception tests. A better classification system of the outdoor recreational potential of the roadway for pleasure driving will be developed. Indices of recreational land use intensity and desirability for pleasure driving will result.

2.94

Charleston Memorial Hospital
Charleston, West Virginia 25304

BRONCO JUNCTION

Merle S. Scherr

Supported by *West Virginia Department of Mental Health*

Purpose:

To provide summer camping experiences for asthmatic children and allow therein a detailed study of asthmatics under controlled "normal" conditions leading to rehabilitation of these patients. Growth and development, therapy evaluation, and psychological study will be undertaken with these patients under twelve-month followup under the direction of a qualified allergist. A program of fall, winter and spring camping for chronically mentally ill State hospital patients will be conducted by W. Va. Dept. of Mental Health in collaboration study.

Subjects:
Asthmatic children between ages of 6 and 15 years. Mental hospital patients of all ages including children.

Methods:
Accepted allergy treatment combined with proper rehabilitation techniques in a nonmedical summer camp environment which has been specially designed for the asthmatic child as demonstrated by the Rehabilitation Committee of Research Council of American Academy of Allergy. The camp is sponsored by Allergy Rehabilitation Foundation, Inc. (non-profit) which also owns it. Mental hospital patients who have been confined in excess of five years will be placed in a nonmedical camp environment under care of professional personnel (nurses, doctors, aides and therapists, etc.) whose status is designated as counselors in typical sense and function as such. This will allow the patients an opportunity to experience a social interchange in a non-institutional setting which will aid in their rehabilitation toward an improved mental condition.

The same camp physical plant and facilities will be used by each group of patients but at a different time of year.

2.95
West Virginia University
Morgantown, West Virginia 26506

TRAVEL AND TOURISM IN WEST VIRGINIA

Raymond H. Haas
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

Study via primary data gathered from questionnaires of the present (1962) and potential market (1962), for tourism in West Virginia. The study of the potential market includes a survey of motivations, attitudes and behavior of upper-income families in six large SMSA's which surrounded West Virginia. Project started in 1962 and will be finished in 1966. Conducted under joint auspices of Office of Research and Development (West Virginia Center for Appalachian Studies and Development) and Bureau of Business Research, West Virginia University.

2.96
West Virginia University
Agricultural Experiment Station
Morgantown, West Virginia 26506

CONSUMER ANALYSIS FOR SPECIFIC FOREST-ORIENTED RECREATIONAL ACTIVITIES IN THE NORTHEAST

Kenneth D. McIntosh
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

(1) To identify and analyze those social, psychological and economic variables which motivate consumers to participate in outdoor recreational activities. (2) to ascertain and evaluate consumer satisfaction with locational and environmental factors as they relate to consumption patterns. (3) To identify and analyze the reactions of participants to rules and regulations, physical facilities, social activities and off-site accessory attractants. (4) To identify and analyze the expenditures incurred by those who actively participate in outdoor recreational activities.

A random sample of hunting and fishing license holders will be drawn and by use of personal interviews or mail questionnaires, or both, information will be generated to be used in the analysis. Multiple correlation analysis will be used based upon such variables as income, age, education, experience, residency, sex, rural background, leisure time, and the frequency of hunting and fishing. The attitude of hunters and fishermen, with regard to hunting and fishing facilities, rules and regulations, attitudes toward landowners and their willingness to pay for the privilege of hunting and fishing on privately-owned lands will be investigated.

2.97
Wisconsin Conservation Department
Box 450
Madison, Wisconsin 53701

CREEL CENSUS ON ESCANABA, NEBISH, PALLETTE, SPRUCE AND MYSTERY LAKES

James Kempinger
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To obtain information on fishing intensity, harvest and correlated fishing statistics on the five lakes. To obtain material and information for studies listed in Jobs V–B and V–I.

Procedures: Information will be collected by means of a compulsory permit system on all days of the week throughout the year. Angler characteristics data will be gathered which will include sex of angler, age classification, residence and method of fishing. All fish will be inspected by Department personnel at the Escanaba Lake Checking Station. Species, length, weight and markings of all fish and sex, in some cases, will be recorded. Fish data will be handled like angler characteristics on Escanaba Lake only in that it will be processed on IBM cards for machine tabulation. During open water season, continuous water temperatures will be recorded and daily water levels recorded. Daily weather records will include temperatures, barometric pressure and observation of clouds, precipitation and wind. Monthly thermo-chemical data on all five lakes will be taken as often as practical to determine stratification on all five lakes. Chemical data will include oxygen, pH, alkalinity and conductivity.

2.98

Wisconsin Conservation Department
Box 450
Madison, Wisconsin 53701

EFFECTS OF RESTRICTIVE SIZE AND BAG LIMITS ON A WILD BROOK TROUT POPULATION

Robert Hunt

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To determine the effect various size and bag limits have on the number, size and age composition of wild brook trout creeled by anglers, angling intensity, and correlated angling statistics; to determine the effect various size and bag limits have on age and size composition of the pre- and post-fishing season brook trout population, on brook trout reproduction potential, and on brook trout production.

Procedure: Harvest of trout under restrictive angling regulations will be determined through a complete creel census. During 1966–67, there will continue to be a minimum size limit of 8 inches and a bag limit of 5 trout.

Each angler will fish by permit on Lawrence Creek. Separate permits will be issued for each stream section. At end of fishing trip, anglers must return the permit to the checking station and present their catch for examination. All trout will be measured, marks will be recorded, gonads examined for sex ratio, and stomachs collected as needed for food habits study.

Trout population estimates, employing electro-fishing gear and the Peterson method, will be made by inch-group immediately before the opening of the trout fishing season, during the season, and immediately after the close of the season in order to determine standing crop, age and size structure, number of legal-sized trout available before and after the fishing season, the standing crop of young-of-the-year trout and number of mature trout in each section of stream at the approach of the spawning season in November. All trout captured by electro-fishing will be measured to the nearest one-tenth inch and weighed to the nearest gram.

Location: Lawrence Creek, Adams and Marquotta Counties.

2.99

Wisconsin Conservation Department
Box 450
Madison, Wisconsin 53701

EFFECTS OF FLY-FISHING ONLY ON A WILD BROOK TROUT POPULATION

Robert Hunt

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To determine what effect fly-fishing only has on the age and size composition of the brook trout creeled and the pre- and post-fishing season brook trout population in the stream.

Procedures: Fly-fishing only will continue in the two lower Sections C and D of Lawrence Creek. The use of live bait, artificial bait, and artificial flies will contine to be legal methods to catch trout in the two upper Sections A and B.

Each angler will fish by permit on Lawrence Creek. Separate permits will be issued for each stream section. At end of fishing trip, anglers must return the permit to the checking station and present their catch for examination. All trout will be measured, marks will be recorded, gonads examined for sex ratio, and stomachs collected as needed for food habits study.

Trout population estimates, employing electro-fishing gear and the Peterson method, will be made by inch-group immediately before the opening of the trout fishing season, during the season, and immediately after the close of the season in order to determine standing crop, age and size structure, number of legal-sized trout available before and after the fishing season, the standing crop of young-of-the-year trout and number of mature trout in each section of stream at the approach of the spawning season in November. All trout captured by electro-fishing will be measured to the nearest one-tenth-inch and weighed to the nearest gram.

Location: Lawrence Creek, Adams and Marquette Counties.

2.100

University of the Witwatersrand
Department of Sociology and Social Work
Johannesburg, South Africa

"FLATLAND" JOHANNESBURG: A STUDY OF A DENSELY POPULATED URBAN AREA

O. J. M. Wagner

Supported by *Department of Education, Arts and Science, Republic of South Africa*

This is a community study of residents in a densely populated, but small geographical, area of Johannesburg. The overwhelming majority of its residents live in flats; hence its name: "Flatland".

Detailed interviews (lasting approximately 2½ to 4½ hours) have been obtained from a cluster sample of 482 respondents. The interviews cover:

(a) The influence of flat life on their behavior.
(b) Leisure time activities of residents in "Flatland".
(c) Family life in Flatland.
(d) Patterns of friendship behavior in Flatland.
(e) Social and political attitudes.
(f) Demographic characteristics of residents in the Flatland area.

2.101

Wyoming Game and Fish Commission
Box 1589
Cheyenne, Wyoming 82001

GAME BIRD HUNTER QUESTIONNAIRE

George F. Wrakestraw

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Project Statement Objective: Formulate hunting regulations.

Segment Objectives: 1. Determination of statewide waterfowl and upland game bird harvest by species. 2. Determination of kill distribution, hunter success, and hunting pressure for all game bird species.

Procedures: 1. Statistical sampling of license holders by means of postal surveys. 2. A statistical analysis of the questionnaire returns will be made. Compilation of results, and analysis of data, and submission of reports to the Bureau of Sport Fisheries and Wildlife and the Wyoming Game and Fish Commission.

Upland game bird harvest data will be compiled and reported by non-project personnel.

3. ECONOMICS

3.1

Auburn University
Agricultural Experiment Station
Auburn, Alabama 36803

MARKETING OF OUTDOOR RECREATIONAL SERVICE IN RURAL AREAS OF ALABAMA

Edward E. Kern, Jr.
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives: 1. To determine economic and related characteristics of outdoor recreational facilities and services in rural areas. 2. To develop guidelines for successful operations of rural outdoor recreational facilities.

Field interviews will be conducted throughout the State among individuals currently marketing outdoor recreational services in rural areas. Sampling will be based on a directory currently being developed by the Alabama Cooperative Extension Service. Information obtained will include type of services offered, locational factors, operational procedures, inventory of facilities, characteristics of development and financial arrangements, returns and expenses, and demand as viewed by the seller of the services.

3.2

University of California
Agricultural Experiment Station
Berkeley, California 94704

ECONOMIC ANALYSIS OF MULTIPLE USES OF WILDERNESS AREAS

Irving Hoch
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Develop methods of measurement of costs and benefits associated with alternative uses of wilderness lands to be used as bases for other analyses by the Wildland Research Center. Apply these methods and measurements to particular wilderness areas and problems. Measure demand for wilderness recreation. Compare wilderness recreation uses with alternative recreational uses. Evaluate non–recreational land uses. Analyze changes in demand over time. Develop inferences on optimal allocation of resources.

Description of Work—The work has three phases: (1) a review of the literature, (2) development of an appropriate theoretical framework for handling the problems involved, and (3) analysis of available empirical evidence pertinent to the problems. Proper evaluation of costs and benefits involves a number of basic issues in economic theory, and these will be investigated. Projections of demand for wilderness use will be attempted on the basis of regressions of per capita visits on per capita income. A number of predictive equations have been obtained, and additional analysis will be carried out. Investigation of alternative use (opportunity cost) will be pursued by attempting to evaluate the net value per acre in the major alternative uses, and to project future demand.

3.3

University of California
Agricultural Experiment Station
Berkeley, California 94704

ECONOMICS OF FIRE PROTECTION ON WILD LANDS IN CALIFORNIA

John A. Zivnuska
Supported by *State of California*

Objectives: (1) To appraise kind and magnitude of economic values protected; (2) To estimate effects on these protected values of alternative levels of fire protection effort; (3) To compare the changes in values protected with relevant costs of protection to determine the optimum level of fire protection effort; and (4) To develop information which will be helpful in allocating available effort most efficiently among areas of different values and protection cost characteristics.

Work plan proposed is controlled by marginal model which defines optimum expenditure level as that level at which a marginal increase in expenditures is exactly offset by a marginal reduction in fire damage incurred. Thus the research must cover both the valuation of fire damage and the effectiveness of control efforts in altering amount of damage occurred. Work on valuation aspect will include study of appropriate value concept for control of public expenditures in fire protection, review of current practice in fire damage appraisal, and development of improved methods for appraising damage to timber, forage, watershed, and recreational values. Work on effectiveness of varying protection levels will be based on statistical analyses of data on past experience designed to attempt to isolate the effects of changing expenditure levels on amount and value of fire losses.

3.4

Pacific Southwest Forest and Range Experiment Station
Berkeley, California 94704

GUIDES FOR FOREST LAND MANAGEMENT UNDER ACCELERATED RECREATION DEMANDS AND INTENSIVE LAND USE

Robert H. Twiss

Supported by *U S.D.A., Forest Service*

Object: To clarify and study the problems of planning and managing forest lands where there are accelerating land-use pressures and intensive recreation demands.

Plan of Work: Study will be made of (1) broadscale landscape management, (2) forest diseases on high altitude recreation areas, principles of analyzing scenic aspects of resources, and campground ecology, (3) trends in the use of campgrounds and other intensively used sites, methods of estimating attendance on forest recreation areas, and what forest recreation visitors seek and how they are affected by crowding or land management changes, (4) improvement in plantings and horticultural treatments on forest recreation areas with emphasis on areas receiving intensive recreation use, areas with severe growing conditions, reservoir sites, and scenic highway routes, (5) recreation's role, especially related to water development, freeway and scenic highway construction, and lumbering in Northern California, (6) recreation planning, and (7) integration of forest recreation with general resource of economic development—economic impact of campers' expenditures on local areas and subregions are under way and these will be broadened to include other major types of forest recreation; and deepened to trace the full impact of the recreation industry on local communities and subregions.

3.5

Colorado State University
Fort Collins, Colorado 80521

THE ECONOMICS AND ADMINISTRATION OF WATER RESOURCES

Stephen C. Smith

Supported by *Office of Water Resources Research, U.S.D.I.*

The objectives of this research are (1) to estimate the economic value of alternative, high altitude, watershed manipulation practices; (2) To relate Colorado's system of legally defined water rights to engineering hydrologic criteria for the improved specification of the rights; (3) to specify how water management organization can best adapt to a changing pattern of public water management objectives in a historically developed water management system where existing supplies are fully appropriated; (4) to specify the relationships between "base studies" of a regional economy and the economics of system design to meet specific demands; and (5) to estimate the value of water and wet lands in wild life recreation use in comparison with alternative uses.

3.6

Cornell University
Agricultural Experiment Station
Ithaca, New York 14850

THE ECONOMICS OF OUTDOOR RECREATION ENTERPRISES

David J. Allee

Supported by *Cooperative State Research Service, U.S.D.A.*

Enterprise management data on commercial and noncommercial outdoor recreation activities will be developed including input-output relationships, external economics, effects of scale, determinants of location and enterprise demand. Data and analysis needed for public as well as private decisions including those related to public development, finance, planning and land use control will be provided. Initially private campground operators will be surveyed to obtain physical and economic data. Management analysis of this data will be supplemented with synthesized combinations of resources and service mixes to present a fuller range of possible experience. Survey data will be supplemented with operating information from public activities, and estimates of technical relationships known to biologists and others who have conducted research on various physical and biological aspects of outdoor recreation activities.

3.7

University of Georgia
Athens, Georgia 30601

GOVERNMENTAL STUDIES

James R. Champlin

Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

The Governmental Studies will consist of three primary areas of investigation; 1) Governmental finance, 2) governmental administration, and 3) legislative analysis.

The governmental finance study will supply alternative recommendations for the financing of outdoor recreation services with supportive data. The governmental administration study will provide an analysis of the present governmental structure for State recreation services and recommendations for increased efficiency and economy via suggested alternatives. The legislative analysis will consist of a summarization and citation of the statutes which contain any reference to authorization for recreational activity and will record the revenue source. Examples of present usage of legislation will be cited.

3.8

University of Georgia
Athens, Georgia 30601

GOVERNMENT AID ON PRIVATE RECREATION DEVELOPMENTS IN THE STATE OF GEORGIA

William T. Moss
Supported by *State of Georgia*

Objectives:

1. To uncover present and future trends at all levels of government in regard to aid extended to the Georgia landowner for development of private recreation areas.

2. To determine existing opinions, attitudes, and legislation of the various levels of government together with expected future trends toward private recreation developments in Georgia.

3. To answer the question: How much and what type of aid can the Georgia landowner expect from Federal, State, and local levels of government on developing a private recreation enterprise?

4. To develop models showing the various uses of government aid and basic considerations on planning in regard to the typical Georgia farmer.

Description of work proposed:
Some of the materials for this study will be gathered from periodical literature available at the library. Although library research may prove worthwhile, the most valuable information will come from personal interviews with those men who represent agencies of authority and from correspondence with other men and agencies close to the subject. From these letters and interviews, it is hoped to get the opinion of these men and agencies in regard to trends concerning the subject. All existing and proposed legislation would be gathered at the State and Federal levels. After the above information is gathered, it will be integrated to form a firm foundation from which basic models can be established that will apply to the typical Georgia landowner.

3.9

Iowa State University
Agricultural Experiment Station
Ames, Iowa 50010

FOREST-RECREATION INVESTMENT OPPORTUNITIES IN IOWA

C. H. Stoltenberg
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objects:

1. Appraise current demand for forest recreation in Iowa.
2. Evaluate institutional framework for public recreation progress.
3. Analyze current supply of forest recreation opportunities, expansion potential.
4. Evaluate impact of forest recreation development on a sample community.
5. Identify areas for productive additional research in forest recreation.

Work Proposed:
Recreationists will be interviewed in at least two sample forest areas in Iowa. The resident population of Iowa will be sampled by a mail questionnaire to estimate current demand. Supply conditions will be studied in cooperation with the Iowa Cons. Comm.

3.10

University of Kentucky
The Agricultural Experiment Station
Lexington, Kentucky 40506

ECONOMIC IMPORTANCE OF RECREATION FACILITIES AND RELATED SERVICES TO KENTUCKY FARMERS

John H. Bondurant
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

To determine and evaluate the importance of recreation as a source of farm income. To inventory the types of recreation facilities available. To determine the importance of location of recreation facilities in relation to population centers. To ascertain the capital, labor and other resource requirements in the development and operation of on-farm types of recreation facilities.

A questionnaire will be used to inventory and describe the different types of farmer-operated recreation facilities in about one-half of the 120 counties in the State. This information will be obtained from County Agricultural Extension Agents, County Soil Conservation Service workers, and Vocational Agricultural

Teachers. This will be followed by obtaining specific information by schedule as to resources used, investment and types of on-farm recreation facilities and related services. The schedules will be obtained from a sample of the significant types of recreation facilities. Additional information on recreation and related data will be obtained from various secondary sources. The information obtained will be analyzed and manuscripts prepared for one or more publications. The manuscripts will probably emphasize the types of facilities available, their location and their economic importance as a source of farm income.

3.11

Louisiana State University
School of Forestry & Wildlife Management
Baton Rouge, Louisiana 70803

AN EVALUATION OF THE EFFECT OF STATE FORESTS AND PARKS ON PUBLIC RECREATIONAL USE OF PRIVATE FORESTS IN LOUISIANA

R. W. McDermid
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives: To determine if further development of State forests and parks will alleviate public demands for outdoor recreation now being made on private forest lands in Louisiana.

The study is designed to develop the following information: who the visitors to these facilities are, and their places of residence; how long they stay and what they use while at these recreation areas. It will evaluate the carrying capacity of existing recreation areas and the potential capacity of undeveloped areas. Thus recommendations can be made as to the need for additional public recreation areas and the size of these areas. In addition the study will appraise the economic effect of these visits by analyzing visitor expenditures for recreation equipment and supplies.

Personal interviews will be conducted among the recreation area users during peak and off-peak seasons. Traffic counters will help determine man-hours, of use, number of visits, and peak loads. Weather data, day of week, and facilities used will be correlated with peak loads to determine their relationships, if any. Frequency distributions of responses will be analyzed by Chi-square to determine statistical significance. Isolated variables affecting areas and users will be analyzed statistically.

3.12

University of Maryland
Agricultural Experiment Station
College Park, Maryland 20742

DEMAND FOR AND AVAILABILITY OF LAND AND WATER ORIENTED RECREATION FACILITIES IN MARYLAND: ECONOMIC ANALYSIS

D. F. Tuthill
Supported by *State of Maryland*

Objectives:

1. To assess the existing facilities in Maryland for land and water recreation purposes.
2. To evaluate the present and future need for recreation facilities in Maryland, based on land and water resources, and analyze the economic potential for the area.
3. To collect cost data for construction and operation of recreation enterprises, particularly those suitable for the farmer or small businessman.

For *Objective 1*—Available material on recreation facilities and use will be used and supplemented as necessary to provide the resource base information for recreation development.

For *Objective 2*—National information on population and income trends, expected increase in leisure time, and changing preference for recreation activities will be interpreted for Maryland conditions to help predict future need for and use of recreation facilities in Maryland.

For *Objective 3*—Costs and returns for recreation enterprises will be determined from existing data, or collected in field surveys of operating units. Those costs and returns will help in decision-making of farms and business units, or for programming procedures in selecting optimum enterprise combinations.

3.13

University of Massachusetts
Agricultural Experiment Station
Amherst, Massachusetts 01002

PRIVATE OUTDOOR RECREATION OPERATIONS AND PUBLIC POLICY IN THE CONNECTICUT VALLEY REGION OF MASSACHUSETTS

John H. Foster
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives: (a) To determine the current role of the public and private sectors in the supply of specified outdoor recreation facilities in a region. (b) To compare public and private sectors on such characteristics as over-all costs and distribution of costs among groups paying them. (c) To suggest criteria for decisions on the respective development of the public and private sectors and to apply these criteria to a region. (d) To suggest public policy which will guide the development of the private sector.

Proposed work: Except for some additional data on the public sector, the project will be based on analysis of existing data on the Connecticut Valley Region. For each of the several specified types of recreation facilities, the public and private sectors will be compared on current use, costs, cost distribution, and similar characteristics. Following this analysis and a literature review, criteria for deciding what facilities should be supplied by each sector will be developed and applied to the study region. The project will be completed with development of suggestions for public policy related to the private sector. The services of two graduate assistants will be used.

3.14

Michigan State University
East Lansing, Michigan 48823

A METHOD OF ASSIGNING A MARKET VALUE TO UNIQUE RECREATION RESOURCES

Louis F. Twardzik
Supported by *Michigan State University*

The aim of this work is to develop a method of assigning a market value to unique recreation resources. An attempt is made to identify special problems of supply and ownership and to suggest a way of providing more equity to the donor of lands for public recreation use. It is suggested that market value of unique recreation resources in private to public transactions be determined by a type of deferred public consumption of the resource. This interpretation of market value would accommodate the public good by providing more equity in tax benefits to donors of unique areas.

3.15

Park and Recreation Administration
Department of Resource Development
Michigan State University
East Lansing, Michigan 48823

AN INVESTIGATION OF LIABILITY INSURANCE PROGRAMS OF RURAL RECREATION ENTERPRISES IN SOUTHERN MICHIGAN

Richard E. Cary
Supported by *Michigan State University*

This project involves the analysis of liability protection programs of selected rural recreation enterprises in southern Michigan. It is intended to determine the significance of the liability problem, and to identify those factors which contribute to it. The basic concepts of liability and the principles of insurance will be examined. Methods for reducing liability risk and insurance problems will be devised.

Data will be obtained from representative enterprises with a wide variety of facilities and activities by means of personal interviews and mailed questionnaires. Information will also be obtained from insurance agencies and companies.

3.16

University of Michigan
Ann Arbor, Michigan 48104

OUTDOOR RECREATION MOTIFS IN MAGAZINE ADVERTISEMENTS

Grant W. Sharpe and William C. Welch
Supported by *University of Michigan*

Advertisers capitalize on societal taste trends to sell products; since outdoor recreation is popular it is expected that advertisers frequently use outdoor recreation themes. The problem is to see if there is a trend in the use of the out-of-doors in selected advertisements since 1947.

3.17

University of Minnesota
Agricultural Experiment Station
St. Paul, Minnesota 55101

ECONOMIC PROBLEMS IN THE USE, ALLOCATION, REGULATION, AND PRICING OF WATER.

Philip M. Raup
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

To estimate supply and demand for water for agriculture and competing uses, currently and for years to come; explore economic consequences of existing laws and doctrine; examine economic issues involved in competition for water among agricultural, recreational, municipal, and industrial uses; appraise alternative forms of organization for conservation, use, and regulation of water resources; and study data bearing on conflicts between public and private rights in control over water resources.

Description of work:
Supply and demand for water in Minnesota will be determined; and adequacy of current legislation regulating permits by Division of Waters and Depart-

ment of Conservation will be tested, and method evaluated. Conflict between public and private interests, and ownership rights will be studied and economic issues examined. Cost of development, division of costs and benefits among users, and delineation of public and private interests will be determined. Detailed research procedures will be developed through joint investigations by economists and law students and professors, and actual research will also be conducted by them. After two years, research will be coordinated with neighboring States making similar investigations to obtain maximum value.

3.18

Missouri University
Columbia, Missouri 65201

STUDY OF THE IMPACT OF OUTDOOR ADVERTISEMENT IN MISSOURI

F. K. Harmston

Supported by *Missouri State Highway Commission and U.S. Bureau of Public Roads*

A theoretical model is being developed to show the role of advertising, especially billbord, in the economic process. Surveys of relevant institutions, the general public, and the touring public will be included.

3.19

University of Missouri
Columbia, Missouri 65201

FACTORS AFFECTING RESOURCE USE AND INCOME POTENTIAL IN THE OZARKS OF MISSOURI

Ronald Bird

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

The objectives of this study are (1) to aggregate the present and potential use of human and other resources in agriculture, recreation and tourism, forestry, manufacturing, retail trade, personal services, and others for the Missouri Ozarks, (2) to determine a frequency distribution of families by levels of income that will result from optimal development of resources, (3) to examine the institutional control of resources and the influence of local custom and desires on their development, (4) to describe the impediments to adjustments in resource use and evaluate the steps that may be taken to lessen their effect, (5) to determine the rapidity with which these adjustments may take place. Objectives (1) and (2) will be pursued the current year. Secondary data will be primarily used. U.S. Census data, highway traffic counts, and various studies relating to resource adjustments in agriculture, forestry, recreation, manufacturing, etc., will be combined in an analysis of development for the region. Primary investigations will be instigated to provide supplementary data when needed. Acceptable sampling techniques and analysis will be followed when primary investigations are required.

3.20

University of Nevada
Reno, Nevada 89507

DEMAND FOR WATER BASED RECREATIONAL ACTIVITIES IN NEVADA

J. B. Wyckoff

Supported by *Office of Water Resources Research, U.S.D.I.*

This study will specifically determine:

a. Economic factors associated with participation in water based outdoor recreational activities in Nevada.

b. Qualitative factors associated with participation in and resultant satisfaction from water based recreational activities in Nevada.

c. Techniques for accurately appraising the total use of recreational facilities which are connected with water.

The relationship of the factors identified in objectives (a) and (b) to total participation in the various activities and to total use at various sites will be determined by multivariate analysis. Models will be developed to predict future needs for the various types and locations of water based recreational activities.

3.21

New Jersey Division of Fish & Game
Box 1809
Trenton, New Jersey 08625

RABBIT, QUAIL, SQUIRREL AND GROUSE

Robert E. Mangold

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objective: To determine the economic value of small game in New Jersey.

Procedure: A questionnaire survey of approximately 5 percent of the number of firearm licensees will be sent out as soon as possible following the close of the 1966 small game season. A systematic sample will be taken from the audited stubs of the 1966 licenses and a questionnaire will be mailed to each licensee in the sample. The questionnaire will be designed to determine how much money the average hunter spent in 1966 to hunt small game and the value placed on rabbit, quail, squirrel, and grouse by the average hunter.

3.22

New Mexico State University
Agricultural Experiment Station
Las Cruces, New Mexico 88001

ECONOMIC ANALYSIS OF RANGE AND RANCH MANAGEMENT DECISIONS ON WESTERN LIVESTOCK RANCHES

J. R. Gray

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives:

1. To identify the opportunities for profitable changes in land management and livestock practices under existing ranch rescurce conditions.
2. To determine which ranch management decisions would be profitable as existing management and resource conditions are changed by the introduction of various land improvement practices, feed purchases, land purchases, leases, and other changes in ranch organization or by changes in cost or price levels.

Description of Work Proposed:

In New Mexico personal interviews will be made in each of the major range livestock production areas of the State to determine the range land required per animal unit, the kinds and amounts of feed used to supplement livestock, and livestock production rates. Investigations will be made of the effects of changes in size of ranches on costs and returns, and real estate values. As a part of the final regional objective, recreational areas on or adjacent to private ranch holdings will be identified and the changes in organizations, costs, and returns will be determined for those ranches which have adopted a recreational-type enterprise as a part of their ranch operations.

3.24

North Dakota State University
Agricultural Experiment Station
Fargo, North Dakota 58102

RECREATION DEVELOPMENT IN NORTH DAKOTA

Rex W. Cox

Supported by *State of North Dakota*

Objectives:

1. Inventory outdoor recreational resources and facilities in North Dakota and evaluate them in terms of present and future needs.
2. Compare recreational programs in North Dakota with those in other States.
3. Determine the economic benefits to the community arising from the utilization of recreational facilities.
4. Recommend action programs for selected areas to aid in development and expanded use of these facilities.

Description of Work:

Inventory of present recreational resources and facilities. Utilization of resources and facilities identified in terms of present and projected demand. Experience of other States with recreational facility development will be surveyed to provide data on costs and development programs that could be used in North Dakota. Studies of specified North Dakota recreation areas to determine economic benefit to areas and communities will be made.

3.25

The Ohio State University
Columbus, Ohio 43210

ALTERNATIVE ECONOMIC RESPONSES TO THE ACID MINE DRAINAGE PROBLEM IN SOUTHEASTERN OHIO

Richard A. Tybout

Supported by *Office of Water Resources Research, U.S.D.I.*

The research seeks to determine the economic merits or alternative means of dealing with acid mine drainage and the extent to which abatement would be in the economic interests of the region. Direct costs implied for coal mining and cost savings for other economic activities (including recreation) will be determined for selected programs of pollution control. Indirect consequences of these costs and cost savings will be determined for the region as a whole using an economic input-output matrix based on data to be obtained from the U.S. Bureau of the Census, Industry Division. The object will be to discover economically efficient alternatives rather than a unique optimum solution. The project will begin in October, 1965 and extend for a period of two years.

3.26

The Ohio State University
Agricultural Experiment Station
Columbus, Ohio 43210

AN ECONOMIC ANALYSIS OF ALTERNATIVE METHODS FOR MARKETING AGRICULTURAL PRODUCTION RIGHTS

John S. Bottum

Supported by *Cooperative State Research Service, U.S.D.A.*

(1) Delineate and describe alternative methods for marketing agricultural production rights separately from the resource in which they are embodied. (2) Estimate the value of the various agricultural production rights studied and the quantity of these rights that would be supplied and demanded at various prices. (3) Analyze the economic impact of each of the alternative methods for marketing the production rights on agricultural production, farm income, the local economy, and market structure.

Ohio landowners and potential demanders of the various agricultural production rights will be interviewed to determine their attitudes toward such a marketing system and the quantities of these rights that would be supplied and demanded at various prices. The impact of such a system on farm production, farm income, the local economy and market structure will be analyzed. The potential for using this marketing system to bring about desired agricultural resource adjustments by government purchase of cropping rights and agricultural labor rights will be studied. Also the system will be studied to determine its potential for increasing multiple land use through the marketing of recreation rights, hunting rights and timber rights.

3.27

The Ohio State University
Columbus, Ohio 43210

ECONOMIC IMPACT OF A MAJOR RECREATIONAL DEVELOPMENT IN A RURAL OHIO COUNTY (GUERNSEY COUNTY)

Charles Dambach

Supported by *Ohio State University Natural Resources Institute*

This is a long-term research project. A baseline for the research was established in 1961 through the conduct of a complete inventory of economic activity within the proposed Salt Forks project area of the Ohio Department of Natural Resources in Guernsey County, Ohio. The economic inventory included agricultural production schedules on farms within the project area and economic surveys of the business operations in the area peripheral to the proposed project. As originally conceived, the project is designed to encompass an area of 18,000 acres within which there is to be a 2,970-acre lake with 75 miles of shoreline. A new highway connecting the heavily populated northern part of the State was at the time of the project initiation under construction. The intent of the project is to establish an economic baseline by which the impact of recreational developments can be measured in future years. It was anticipated that resurveys of economic activities in the affected area would be made at approximately 5-year intervals. The development phase of the project is now nearing completion.

Complete records of the project are kept in the Natural Resources Institute and will be available for future studies as development progresses.

3.28

Oklahoma State University
Stillwater, Oklahoma 74074

ECONOMICS OF AGRICULTURAL LAND AND WATER USE, CONSERVATION AND DEVELOPMENT IN WATERSHEDS OF OKLAHOMA

Daniel D. Badger

Supported by *Oklahoma State University*

The planning, installation and operation of watershed programs with optimum economic efficiency and equity require more knowledge of potential primary and secondary effects. Objectives are (1) to determine the actual and potential changes in use of flood plain land by farmers as a result of reduction in flooding afforded by upstream watershed development programs, (2) to develop alternative predictive models of flood plain land use change following flood protection, (3) to estimate the effect of watershed development upon farm real estate values and prices, (4) to determine the potential value of the water supply created by the flood water retarding structures for irrigation purposes, (5) to estimate the local secondary effects of the watershed development programs, and (6) developing alternative recreational facilities. Basic land resource and type of farming data will be obtained from a survey of 200 farm operators with flood plain land in the watersheds of the Washita River Basin of Central Oklahoma. Data from secondary sources will be used to identify major trends in the use of upland and bottomland in the Washita Basin.

3.29

Oregon State University
Corvallis, Oregon 97331

WILLAMETTE BASIN DEVELOPMENT STUDY

Gordon R. Sitton

Supported by *State of Oregon*

Objectives:

1. Identify the resources, institutions, and other

determinants that will limit the direction and magnitude of the economic prospects of the Basin.

2. Compile an inventory of the resources in the Basin and evaluate the characteristics of these resources which will influence development of the Basin and possible changes in resource use under alternatives for development.

3. Isolate alternative possibilities for economic development of the Basin and identify criteria necessary for evaluation of the various alternatives.

4. Review existing data on economic prospects, especially as it permits evaluation of alternatives.

5. Review current research to determine what data will be forthcoming to supplement existing data.

6. Determine the additional data needed for the evaluation of alternative schemes for economic development of the Basin.

Progress to Date:
Considerable descriptive materials have been assembled and several consumer, manufacturing, and processing surveys are underway or completed.

3.30
Pennsylvania State University
Agricultural Experiment Station
University Park, Pennsylvania 16802

WILDLAND RECREATIONAL MANAGEMENT

J. L. George
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

(1) Develop, evaluate, and compare various combinations of uses of timber, wildlife, water, and land resources to determine the degree of compatibility of such use with the economic and social needs of our society and the interests of the landowner. (2) Explore the possibilities of developing unique recreational activities in the use of a wildland area, introducing new game species, and devising new techniques or methods of harvesting wildlife and timber resources on a wildland area. (3) Determine the characteristics of the demand curve for various recreational uses of a wildlife area at different user fee rates. Relate the demand curves to production functions and cost analysis resource combinations for recreational purposes.

To be conducted on Quehanna, 40,000 acre wilderness area in conjunction with State action agencies relating to forests and water, game, and fish.

3.31
Purdue University
Agricultural Experiment Station
Lafayette, Indiana 47907

DETERMINATION OF OPTIMUM COMBINATIONS OF OUTDOOR RECREATION AND TIMBER PRODUCTION OR OTHER ALTERNATIVE ENTERPRISES ON PRIVATELY OWNED PROPERTIES IN INDIANA

J. C. Callahan
~~Supported~~ by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives: 1. To determine types of outdoor recreational opportunities suitable for private investors having different levels of management ability and other contributory resources.
2. To evaluate the optimum allocation of resources among relevant outdoor recreational and other land-using alternatives for selected bases and typical ownership situations.

Work Proposed: Cost and return data will be collected from selected outdoor recreational enterprises. These data and other secondary enterprise data will be analyzed using existing linear programming models to estimate optimum allocation of available resources for specific and general land ownership situations. Descriptive analyses will also be made of management functions with particular attention focused on unique management abilities and requirements necessary for the successful operation of outdoor recreational enterprises.

3.32

U.S. Department of Agriculture
Washington, D.C, 20250

RESOURCE ADJUSTMENTS TO PROVIDE INCOME FROM PRIVATE OUTDOOR RECREATION ENTERPRISES

Melvin R. Janssen
Supported by ***United States Department of Agriculture***

Object: To assess the opportunities for specific types of outdoor recreation enterprises either in connection with farming or as a sole enterprise in rural areas of Southern Indiana and adjoining States.

Plan of work: The 33-county area of Southern Indiana and Louisville, Ky. will be the study area. Outdoor recreation will be inventoried, including development of a theoretical framework for outdoor recreation enterprises in relation to farming. Study will be made of the use patterns and preferences of users for camping, fishing, hunting, boating and picnicking facilities; the potential use of public and private enterprises that are suitable for farmer or landowner development; the combination of characteristics users prefer; and the relevant variables that affect participation in outdoor recreation facilities. Independent variables will include income, age, education, occupation, days of paid vacation, and family status. Total demand for such facilities for various areas and the kinds, location and extent of recreation enterprises feasible in various areas will be estimated. The relation of recreation to other enterprises in the use of resources under a series of typical conditions will be determined to find where recreation enterprises best fit, and to help determine location and size of enterprises needed to meet the indicated demand.

3.33

University of Rhode Island
Kingston, Rhode Island 02881

OPTIMAL PLANNING OF RECREATIONAL DEVELOPMENT FOR CHARLESTOWN, RHODE ISLAND

Arthur Jeffrey
Supported by *State of Rhode Island*

Objectives:
(1) Ascertain the attitudes and goals of the residents in the Area.
() Determine the relative economic costs and benefits of those projects or plans which conform to the desires of the community.

Work Proposed:
The first objective will be attained using the technique of Scalogram analysis. An individual survey will be made of a sample population. The results of the survey will be used to rank the residents favorable or unfavorable in their attitude toward recreational development and determine their recreational goals. Benefit-cost analysis will be used to attain the second objective. Costs will be determined by considering the initial capital costs, the annual operating and maintenance costs, interest rate on investment, opportunity and supercession costs. Benefits will be estimated from varying prices in land transfers. Construction and improvement of commercial structures will be investigated. An attempt will be made to determine the increase or decrease in revenue to the community stemming from the establishment of a recreational facility.

3.34

University of Rhode Island
Agricultural Experiment Station
Kingston, Rhode Island 02881

ECONOMIC IMPACT OF MARINE-ORIENTED ACTIVITIES IN THE SOUTHERN NEW ENGLAND MARINE REGION

Niels Rorholm
Supported by *U.S. Department of Commerce and State of Rhode Island*

Objective:
1. To determine the present and estimate the future amounts of human and economic resources employed in marine-oriented activities of a commercial, educational, research, defense and recreational nature.

2. To analyze the relationship between the marine-oriented activities and the general economy of the Area including estimates of economic and employment impact.

Procedures: The initial work will concentrate on a detailed study of the marine-oriented activities. On the general economy only secondary data will be collected. Later phases will deal with the remaining parts of the regional economy and the region's population.

Data on human resources employed, investment, costs, sales and future plans will be gathered through personal interviews. Secondary data from Sales Tax Divisions, Census of Manufacturers, Census of Business and Department of Labor will also be utilized.

3.35

San Jose State College Recreation Department
San Jose, California 95110

ANALYSIS OF FEDERAL GRANTS-IN-AID PROGRAM EXPENDITURES AND TYPES OF EXPENDITURES FOR OUTDOOR RECREATION IN CALIFORNIA

Linda Christensen
Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

No. 1. Analysis of Federal Grants-In-Aid Program, Land and Water Conservation Fund, Pacific Southwest Region: Study of funds granted and expended in California, Nevada, Arizona, Hawaii, Guam and

American Samoa for outdoor recreation, including an analysis of type of planning accomplished, lands acquired, type and scope of development and relationship to general planning. The intent is to continue up-dating the study.

No. 2. Survey of Expenditures for Outdoor Recreation in counties and cities in California. A tabulation will be made of expenditures for outdoor recreation by all counties and selected cities in California for a 15-year period, together with an analysis by geographic area, size of jurisdiction, and other identifiable factors.

3.36

South Dakota State University
Water Resources Research Institute
Brookings, South Dakota 57006

ECONOMIC POTENTIALS FOR WATER RESOURCES DEVELOPMENT IN SOUTH DAKOTA

Rex D. Helfinstine

Supported by *Office of Water Resources Research, U.S.D.I.*

South Dakota needs to determine the potential for water resource development in the State because of the need to find a way to arrest and reverse the decline going on in the State's economy. Evidence of this decline includes: farms are becoming fewer, young people are migrating out of the State in large numbers, small towns are declining, and incomes remain low relative to the rest of the U.S. Water resource development may offer one of the most promising avenues for improving both the urban and rural sectors of the economy through industrial diversification, recreation development, and increased and more stable agricultural production and associated business activities.

Objectives of this project include:

1. To inventory the resources of the State;
2. To evaluate the potential contribution of water resource development to the economy of the State, the Missouri Basin region, and the Nation;
3. To determine the profitability of integrating irrigation into individual South Dakota farmer's operations, including irrigation from the Oahe Reservoir and from underground sources;
4. To determine benefits to the State and individuals from development of water-based recreation;
5. To analyze other likely possibilities for water resource development including industrial and municipal uses;
6. To develop criteria for allocation of water among the various feasible uses in South Dakota.

3.37

Southern Illinois University
Carbondale, Illinois 62901

A SURVEY OF THE PROVISIONS IN LEASING CONTRACTS AND RENTAL RATES PAID WHEN LEASING RURAL LAND FOR OUTDOOR RECREATION USES IN ILLINOIS

Dwight R. McCurdy

Supported by *State of Illinois*

The Nation's population is expected to double in the next 35 years and participation in outdoor recreation is expected to triple. Much of the land used for outdoor recreation is and will be in public ownership. However, the private sector will have to help in the supply. One of the ways private landowners can open their rural lands for our Nation is through the use of leases to persons and organizations.

Illinois now houses 5.6 percent of the Nation's population and only 1.6 percent of the Nation's land. Approximately 98 percent of this land is in private ownership. Only 2 percent of Illinois is open to the public. Private land for outdoor recreation will be in great demand by the year 2000 if it is not opened for public use.

This survey has 3 primary objectives:

1. To determine what the various outdoor recreational uses are for which rural land is being leased in Illinois.
2. To determine the rental rates and methods of payment to landowners for outdoor recreation uses.
3. To determine the nature of land rental contracts for outdoor recreation uses.

From this survey, it is hoped that model leases for the various uses can be written. These models should be equitable from the lessee's and lessor's point of view and still reflect the prevailing situation throughout the State for each use.

Questionnaires have been mailed out with a 35% response and are now being analyzed by land use categories.

3.38

University of Tennessee
Knoxville, Tennessee 37916

KNOXVILLE ANNUAL TOURIST SURVEY

Lewis C. Copeland

Supported by *City of Knoxville, Tennessee*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

The research begins with the characteristics of travelers, who are defined as persons away from home outside their commuting zone during the day or overnight, their origin and destination, their activities in the State, and the market created by their demands. Travel is measured in terms of the number of persons, parties, and vehicles; intercity passenger miles traveled; and their expenditures for various items.

The volume and trends of travel are analyzed in relation to the facilities for lodging, eating, and recreation; auto and gasoline services; and passenger transportation via railroad, plane, and bus. Business activities associated with travel are measured in terms of volume of sales and receipts, firms at the service of travelers, employment, in and income and tax revenues derived from, the travel-serving business.

3.39

University of Tennessee
Knoxville, Tennessee 37916

THE TRAVEL BUSINESS IN LOUISVILLE, KENTUCKY

Lewis C. Copeland
Supported by *City of Louisville, Kentucky*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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3.40

University of Tennessee
Knoxville, Tennessee 37916

THE KANSAS CITY TOURIST TRADE: AN ECONOMIC ANALYSIS

Lewis C. Copeland
Supported by *City of Kansas City, Kansas*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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3.41

University of Tennessee
Knoxville, Tennessee 37916

TOURISTS AND ALABAMA BUSINESS: AN ECONOMIC ANALYSIS

Lewis C. Copeland
Supported by *State of Alabama*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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3.42

University of Tennessee
Knoxville, Tennessee 37916

TRAVEL IN ARKANSAS: AN ECONOMIC ANALYSIS

Lewis C. Copeland
Supported by *State of Arkansas*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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3.43

University of Tennessee
Knoxville, Tennessee 37916

ILLINOIS TOURISM STUDY: AN ECONOMIC ANALYSIS

Lewis C. Copeland
Supported by *State of Illinois*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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3.44

University of Tennessee
Knoxville, Tennessee 37916

TRAVEL IN IOWA: AN ECONOMIC ANALYSIS

Lewis C. Copeland
Supported by *State of Iowa*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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3.45

University of Tennessee
Knoxville, Tennessee 37916

THE TRAVEL BUSINESS IN KENTUCKY: AN ECONOMIC ANALYSIS

Lewis C. Copeland
Supported by *State of Kentucky*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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3.46

University of Tennessee
Knoxville, Tennessee 37916

TRAVEL IN MISSISSIPPI: AN ECONOMIC ANALYSIS

Lewis C. Copeland
Supported by *State of Mississippi*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

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3.47

University of Tennessee
Knoxville, Tennessee 37916

NORTH CAROLINA IN TRAVEL SURVEY: AN ECONOMIC ANALYSIS

Lewis C. Copeland
Supported by *State of North Carolina*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

The research begins with the characteristics of travelers, who are defined as persons away from home outside their commuting zone during the day or overnight, their origin and destination, their activities in the State, and the market created by their demands. Travel is measured in terms of the number of persons, parties, and vehicles; intercity passenger miles traveled; and their expenditures for various items.

The volume and trends of travel are analyzed in relation to the facilities for lodging, eating, and recreation; auto and gasoline services; and passenger transportation via railroad, plane, and bus. Business activities associated with travel are measured in terms of volume of sales and receipts, firms at the service of travelers, employment in, and income and tax revenues derived from, the travel-serving business.

3.48

University of Tennessee
Knoxville, Tennessee 37916

THE SOUTH CAROLINA TRAVEL TRADE: AN ECONOMIC ANALYSIS

Lewis C. Copeland
Supported by *State of South Carolina*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

The research begins with the characteristics of travelers, who are defined as persons away from home outside their commuting zone during the day or overnight, their origin and destination, their activities in the State, and the market created by their demands. Travel is measured in terms of the number of persons, parties, and vehicles; intercity passenger miles traveled; and their expenditures for various items.

The volume and trends of travel are analyzed in relation to the facilities for lodging, eating, and recreation; auto and gasoline services; and passenger transportation via railroad, plane, and bus. Business activities associated with travel are measured in terms of volume of sales and receipts, firms at the service of travelers, employment in, and income and tax revenues derived from, the travel-serving business.

3.49

University of Tennessee
Knoxville, Tennessee 37916

THE TENNESSEE TOURIST TRADE: AN ECONOMIC ANALYSIS

Lewis C. Copeland
Supported by *State of Tennessee*

The purpose of this research is to measure the volume and trends of travel for all purposes, both within the State and from other States. The primary emphasis is on the economic impact of travel-related activities and the several types of business that have arisen to serve the needs of the traveling public and to transport travelers.

The research begins with the characteristics of travelers, who are defined as persons away from home outside their commuting zone during the day or overnight, their origin and destination, their activities in the State, and the market created by their demands. Travel is measured in terms of the number of persons, parties, and vehicles; intercity passenger miles traveled; and their expenditures for various items.

The volume and trends of travel are analyzed in relation to the facilities for lodging, eating, and recreation; auto and gasoline services; and passenger transportation via railroad, plane, and bus. Business activities associated with travel are measured in terms of volume of sales and receipts, firms at the service of travelers, employment in, and income and tax revenues derived from, the travel-serving business.

3.50

Texas A. and M. College
Agricultural Experiment Station
College Station, Texas 77843

DEVELOPING AGRICULTURAL LAND IN RECREATIONAL USES UNDER PRIVATE OWNERSHIP

A. B. Wooten
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives: I. (a) To evaluate alternative intensities of agricultural land use for on-farm commercial recreation in terms of on-farm cost-benefits and to determine the potential effects on over-all farm income; (b) To estimate total man days of recreation available on the farm; (c) To develop guides for the use of landowners in developing agricultural land for recreational purposes.

II. To estimate total additional man days of recreation available in the area.

An attempt will be made to classify the commercial recreational operations into the following categories using as the criteria the leasing or contractual agreements (1) Day fishing; (2) Yearly fishing lease; (3) Club-lake; (4) Day hunting; (5) Seasonal lease; (6) Shooting resort.

A random sample stratified according to the preceding categories will be taken and analyzed to determine: I. Acres of land devoted to recreation facilities; II. Kinds and cost of facilities; III. Kind and quality of labor required for operation under different systems; IV. Costs of stocking and maintaining fish and game; and V. Annual returns from operation.

Alternative systems of operation will be compared to establish guides for maximizing profit from the land utilized and recreational facilities constructed.

An attempt will be made to establish a logical method of estimating the "human" carrying capacity or recreational man days available on a given acreage utilizing such variables as water area, fish and wildlife density and timber density.

3.51

U.S. Department of Agriculture
Washington, D.C. 20250

ECONOMIC APPRAISAL OF OPPORTUNITIES FOR OUTDOOR RECREATION ENTERPRISES ON FARMS IN SOUTHEASTERN OHIO

Buis T. Inman

Supported by *U.S. Department of Agriculture*

Object: To inventory kinds of outdoor recreation currently provided on farms; to determine the economic feasibility of a recreational enterprise on farms; and to evaluate the impact of farm-provided recreation on employment, income and general economic activity of the area.

Plan of Work: From a selected sample of typical Southeastern Ohio farms, data will be obtained on the extent to which recreation enterprises are combined with farming; capital requirements and availability of capital, costs, incomes and extent of use of such enterprises; and characteristics and residence of users. From data obtained from various sources, firms will be chosen to represent the entire range of other recreation facilities on farms financed by private capital. Typical capital requirements, in-put items, expenses, receipts, net incomes, and extent of employment will be determined for various kinds of recreation enterprises, as well as availability of capital for development of recreation. A sample of users will be interviewed to find the extent to which they use or will use specified kinds of recreation. From secondary sources, similar data will be obtained regarding use of public recreational facilities. Levels of use that may be made of various kinds of private recreation enterprises will be projected in order to estimate the impact of projected use on the local economy.

3.52

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C. 20240

STUDY OF FY 1967 FEDERAL OUTDOOR RECREATION BUDGET

Morton J. Garfield

Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

This study will attempt to identify the total Federal outdoor recreation budget for FY 1967 for those budget elements which lend themselves to forward programming, i.e., development/construction, land acquisition, operations and management, technical assistance, research, planning, and administration. It will also identify outdoor recreation obligations for the last full year of operation (FY–1965) for those elements which do not lend themselves to forward programming, i.e., loans, grants, and the many "peripheral" activities of agencies having a secondary impact on recreation (as identified in the inventory of Federal outdoor recreation programs).

3.53

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C. 20240

AN ANALYSIS OF THE FEDERAL CREDIT PROGRAMS RELATED TO COMMERCIAL OUTDOOR RECREATION

Morton J. Garfield

Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

To examine the nature and magnitude of Federal credit programs that have an impact on the Nation's supply of commercial outdoor recreation. The first phase of the study involves the collection and analysis of loan data from the Small Business Administration, Area Redevelopment Administration (now Economic Development Administration), Farmers Home Administration and other Federal agencies lending to private enterprise. The analysis part of the study will determine (to the extent the available data permits) (1) the geographic distribution of Federal credit programs compared with the supply of outdoor recreation resources; (2) number, value and types of loans made during 1962, 1963, and 1964; (3) measure the recreation effectiveness of credit programs by comparing agency programs; (4) measure program constraints and the patterns of loan applications and approvals; and (5) assess the need for further Federal credit programs.

3.54

Bureau of Outdoor Recreation
Department of the Interior
Washington, D.C. 20240

SURVEY OF NEED FOR FEDERAL CREDIT FOR FINANCING PRIVATE OUTDOOR RECREATION

Morton J. Garfield

Supported by *Bureau of Outdoor Recreation, U.S.D.I.*

The purpose of this survey is to investigate the availability of private credit and the adequacy of Federal credit programs with respect to the outdoor recreation industry. The appraisal of credit legislation proposing a special loan guarantee for outdoor recreation cannot be intelligently made without sufficient basic data on the demand for and the availability of credit for the outdoor recreation industry. Moreover, in the Nationwide Planning process, this survey will contribute to the assessment of the role and problems of the private sector.

Specific objectives of this survey are:
1. To determine if there is a significant shortage of private credit available for the outdoor recreation industry.
2. To determine if banks, savings and loan associations, and life insurance companies need additional Federal assistance to meet adequately the demand for credit in the outdoor recreation industry.
3. To ascertain the problems encountered by banks, savings and loan associations, and life insurance companies in lending to recreation enterprises.

3.55

U. S. Department of Agriculture
Washington, D.C. 20250

ECONOMIC APPRAISAL OF IMPACTS OF URBAN GROWTH ON RURAL LAND USE

Hugh A. Johnson
Supported by *U.S. Department of Agriculture*

Object: To determine changes in land use occurring in rural-urban fringe areas around cities, factors causing the changes, and land use problems stemming from the changes; and to develop guides for use of agricultural lands, for transfer of lands from farm to nonfarm uses, and for working out land use adjustments.

Plan of Work: Changing land from rural uses to urban and urban-related uses in environs of major metropolitan areas will be analyzed. Land use and cover keys for airphoto interpretation oriented specifically to urban fringe land use situations will be developed. A land use and ownership classification system will be field-tested in urban regions with different land use and ownership patterns and results correlated with the land use keying system developed for the airphoto analysis. The impact of urban sprawl on rural areas will be analyzed to ascertain the factors causing the major changes. Alternative opportunities to conserve viable agricultural communities through regional planning and guided area development will be evaluated, including ways to compensate land owners for water and other resource conservation and for certain amenity products, such as preservation of open space, and creation of outdoor recreation opportunities. Planning of new towns and urban developments will be analyzed. Specific factors involved in the changing land use and kinds of problems stemming from the changes will be isolated and keyed to the airphoto and classification studies, and land-use conditions in various urban fringe areas determined.

3.56

U. S. Department of Agriculture
Washington, D.C. 20250

THE ECONOMICS OF OUTDOOR RECREATION AS A USE OF RURAL LANDS

Hugh A. Johnson
Supported by *U.S. Department of Agriculture*

Object: To ascertain rural land characteristics needed for various outdoor recreation and supply of such land; to identify types of recreational land uses amenable only or primarily to public development, private enterprise, or both; and to explore means to expand various types of recreational uses of rural land.

Plan of Work: Information will be obtained through interviews, questionnaires, data analysis, etc. Components of effective demand for outdoor recreation will be appraised in relation to capacity of the resources. Studies will be made of (1) management and community attributes needed to operate recreation enterprises, and determination of sizes and combinations of recreational activities needed, (2) selected examples in recreation areas primarily in public ownership, primarily in private ownership, and both. Information will be obtained on costs of acquiring the land and other resources, costs of developing and operating the facilities, etc.; and (3) the various types of private recreation enterprises which might be adapted to farms and rural communities (vacation farms, campgrounds, hunting, fishing, etc.) Various kinds of problems limiting optimum development of outdoor recreation on rural land will be evaluated and analysis made of ways to overcome these problems, as well as possible new activities, combinations or incentives that might facilitate additional developments.

3.57

U.S. Department of Agriculture
Washington, D.C. 20250

ECONOMIC APPRAISAL OF LOCAL SOIL, WATER AND OTHER RESOURCE ORGANIZATIONS

Raymond D. Vlasin
Supported by *U.S. Department of Agriculture*

Object: Analyze the organization, financing, operation, supervision and coordination of resource and resource-related local organizations such as conservancy, recreation, wildlife, irrigation, drainage, watershed, soil conservation, forest preserve, and grazing districts and associations.

Plan of Work: **A general inventory will be continued of the kinds and numbers of local resource organizations found in different States. Secondary data, including that provided by the Census of Governments, will be used for the inventory. Distinctive and significant types of local organizations will be selected for analysis. Individual organizations will be chosen for case studies. Sources of data will include relevant statutes, regulations, organizations reports and files, and interviews with local and State personnel and other informed persons. When possible, these will be supplemented with information from published bulletins and other research reports, journal articles, books and pamphlets. Particular attention will be given to the preparation of short bulletins reporting in depth the objectives, organization, supervision, operation, financing and coordination of resource development by particular local districts or associations and an evaluation of the extent to which form of organization affects accomplishment of its objectives.**

3.58

U.S. Department of Agriculture
Washington, D.C. 20250

RURAL RESOURCE USE AND POTENTIALS FOR ECONOMIC DEVELOPMENT IN LOW-INCOME AREAS OF ARKANSAS

Max M. Tharp

Supported by *U.S. Department of Agriculture*

Object: **To (1) estimate the potential effects on income and employment of organizing and developing local resources for optimum agricultural, industrial, and recreational uses; (2) evaluate the effects on income and employment of realizing the farm adjustment potentials in the area; (3) estimate the degree to which physical and human resources are under- or unemployed; (4) evaluate income and employment effects of possible alternatives for use of physical and human resources; and (5) appraise specific development efforts and effects.**

Plan of Work: **Data relating to agriculture, forestry, and characteristics of the labor resources will be assembled and evaluated. Criteria will be developed and used for classifying the rural population into employability groups. The developed parameters will be applied to census figures for estimates of the relative employability of the population. The effects of various resource developments on employment and incomes will be analyzed and resultant income opportunities appraised. Current and potential income levels will be compared. The analysis will be used to appraise policies for improving employment opportunities.**

3.59

U.S. Department of Agriculture
Washington, D.C. 20250

OPPORTUNITIES FOR ADJUSTMENTS OF FARMS AND FARM FAMILIES IN LOW-INCOME FARMING AREAS IN MISSISSIPPI

Max M. Tharp

Supported by *U.S. Department of Agriculture*

Object: **To determine (1) ways to facilitate desirable shifts in farm size and use; (2) effects on income and employment of realizing farm adjustment potentials in the area; (3) physical and human resources under- or unemployed; and (4) problems associated with development efforts and effects in terms of income, employment, etc.**

Plan of Work: **The adjustment potential of farm families in the clay hills of Mississippi will be analyzed, and will concern (1) causal factors in low incomes (family and farm characteristics relating to success or failure to achieve acceptable incomes), and (2) adjustments in resource use that have been made primarily during 1945–1960 and their effects on land use, labor force, economic activity of the area, and incomes. The income effects to farmers from adoption of improved technology, with given resources as compared to present returns will be analyzed. Study will be made of present and expected returns from improved management of farm woodlots and idle lands that are potential forest lands; reforestation; timber contracts in encouraging land-use changes; potential effects of local industrialization and recreational or other resource developments on employment and incomes; and impact of industry location or expansion including recreational resource development, on employment, land use, economy of the community and income.**

3.60

U.S. Department of Agriculture
Washington, D.C. 20250

APPRAISAL OF ALTERNATIVE MEANS OF ECONOMIC DEVELOPMENT OF SPECIFIC LOCAL RURAL AREAS

Alan R. Bird

Supported by *U.S. Department of Agriculture*

Object: **For specific rural areas and regions, to evaluate public programs and determine alternative possibilities for raising the level of economic development of rural areas and increasing the incomes of rural people.**

Plan of Work: **The economic status and potential of five rural areas designated under the Rural Renewal**

Program will be assessed. Similar studies will be made in other areas as need arises. Each area study will result in a report that includes (1) an inventory of human and natural resources of specified renewal areas, (2) Other data identifying significant trends, and (3) an assessment of the economic potential of the area sufficient to provide basis for the review of the Rural Renewal Program, including projections of the area economy with and without that program. Approximations will be made of budgets for various sectors of the local economy such as agriculture, forestry, recreation, nonfarm industry, and the public sector. Account will be taken of interactions among the various sectors. Refinement of initial studies using regression analysis, linear programming, Markov chains, and other statistical and econometric tools will be pursued as warranted. As problems of special and likely general importance are revealed for a local area, a more detailed economic analysis of those problems will be undertaken.

3.61

Utah State University
Logan, Utah 84321

THE SOCIO-ECONOMICS OF RECREATIONAL USE OF THE CACHE ELK HERD

John D. Hunt
Supported by *Utah State University*

In the case of some wildlife resources, hunter fees are supporting the entire management and maintenance operations. The resource, however, provides recreational enjoyment for a much broader spectrum of users. There is a need to examine the costs and incomes for this whole spectrum.

In the case of the Cache elk herd, hunter fees are supporting the entire management and maintenance program. It appears, however, that the nonconsumptive (sightseeing) use of the Cache elk herd, besides providing a recreational opportunity to hundreds of people, is creating or has a potential of creating problems of effective game management, pollution, administration and public relations, yet not sharing in the costs of preventing or solving these problems.

This study is designed to examine the value of this resource for all recreational pursuits, the economic contribution of all segments of its use to its management and surrounding economies, and the socio-economic characteristics of its users. It will examine means for better distributing the costs and benefits among all users.

Data will be collected through sample interviews and questionnaires and examination of existing records.

3.62

Utah State University
Logan, Utah 84321

ECONOMIC FEASIBILITY OF PRIVATE RECREATION DEVELOPMENT IN THE BEAR LAKE AREA

John D. Hunt
Supported by *State of Utah*

Objectives:

1. To investigate and quantify the major factors which have a bearing upon the economic feasibility of private recreation development in the Bear Lake Area.
2. To prepare a comprehensive master plan for the recreational development in the Bear Lake Area based upon the results of data collected in Objective #1.

Work Proposed:

1. Inventory existing recreation developments.
2. Determine potential available land area for each specific recreation use and location.

3.63

Utah State University
Logan, Utah 84321

THE SOCIO-ECONOMICS OF RECREATIONAL USE OF THE CACHE ELK HERD

J. D. Hunt
Supported by *State of Utah*

Objectives:

1. To investigate the social and economic importance of the Cache elk herd for hunting.
    A. To determine the direct costs of management.
    B. To determine the hunting use and the socio-economic characteristics of the user.
    C. To determine the social and economic importance to the local area and State.
2. To investigate the social and economic importance of the Cache elk herd for sightseeing at Hardware Ranch.
    A. To determine the direct cost of managing sightseeing.
    B. To determine the sightseeing use and the socio-economic characteristics of the user.
    C. To determine the social and economic importance to the local area and State.
3. To furnish information for the formation of policies and procedures for realizing the full social and economic potential of the Cache elk herd and equating costs for benefits among all users—the hunter and the sightseer.

study will be a detailed analysis of the financial success of youth camps as it relates to the ability to continue operating as a youth camp as opposed to commercial uses of land and water resources.

From the Vermont Health Department, a list of all youth camps in the State will be compiled. All operators of youth camps will be personally interviewed. From the assembled data a comparative analysis will be made of camps of various types, sizes, and types of ownership. From these data, conclusions relating to the place of the youth camp industry in the economy of the State of Vermont will be drawn.

3.68

Waterloo Lutheran University
Waterloo, Ontario, Canada

ONTARIO DEPARTMENT OF ECONOMICS AND DEVELOPMENT

John E. Lewis

Supported by *Ontario Department of Economics and Development*

The purpose of this study is to gain a better understanding of the factors that determine the location of ski resorts in Southern Ontario.

A questionnaire, administered on a personal interview basis in the field during the skiing season, will be designed to answer questions relevant to preferences of certain ski locations, facilities, etc. Ski resort operators will also be interviewed in an effort to gain information as to length of runs, degree of slope, basis of establishment, accommodation, etc. The results from both questionnaires will be analyzed and a model incorporating the key factors will be constructed. The resultant model will be applied to the existing locations as well as to areas of potential development. In this way, the model will reveal the shortcomings which exist at some established ski resorts and, secondly, it will aid in the selection of new ski sites when demand warrants their construction.

Groups that will benefit from this study include investment firms who must raise capital for new resorts, highway departments who plan roads to recreational areas, the tourist industry itself, and finally, the regional development branch of the government.

A systems approach enables an analysis to be carried out of the inter-relationships between the propensity to ski and the facilities available. Therefore, resultant guidelines may be established for future development of the industry.

Work on this project began in October 1966 and will be completed by September 1967.

3.69

West Virginia University
Morgantown, West Virginia 26506

ECONOMIC FEASIBILITY AND IMPACT OF VERTICAL OR SHORT TAKE-OFF AND LANDING AIRCRAFT FOR THE APPALACHIAN REGION

E. C. Carter

Supported by *National Aeronautics and Space Administration*

There are many areas in the Appalachian Region with potential for recreational, specialty industries and other types of development which are rather remote from a first class highway. The region has an abundance of open space and green area, which urban residents seem to be demanding, as well as available developable water power. However, the extremely high cost of highway facilities is often prohibitive, especially when these highways must compete not only with other highway improvements, but also with funds for all other governmental programs.

It is hypothesized that if the introduction of V/STOL air transportation service to the Appalachian Region is economically feasible, it will have a tremendous impact on regional development.

Since the major potential for V/STOL service appears to be in the Commercial Air Market, this existing service will be evaluated in a typical State, West Virginia, by a sample study of outbound flights. This study, supplemented by a study of private aircraft, intercity bus and rail travel, will determine trip patterns and potential demand (by projection) for future V/STOL trips. The economic impact of this service on the State development will also be evaluated.

3.70

University of Wisconsin
Agricultural Experiment Station
Madison, Wisconsin 53715

ECONOMIC AND LEGAL FACTORS IN PROVIDING, USING AND MANAGING WATER RESOURCES IN AGRICULTURE

R. J. Penn

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives: (1) To determine the economic considerations that affect use and management of water in agriculture and competing uses. (2) To identify and describe rights in water and the administrative arrangements that regulate water use in the several States.

4. RESEARCH METHODS

4.1

Cornell University
Agricultural Experiment Station
Ithaca, New York 14850

PLANNING TO PREVENT CONFLICT IN RURAL LAND USES

David J. Allee
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

This study will develop planning methodology, standards and data based upon the existing conflicts between poultry and other rural land use activities. The costs of alternative management and disposal methods will be related to locational attributes. Methods to determine the economic impact of alternative land use mixes will be sought. Land use controls including the composition of exclusive agricultural zones, determination of boundaries, the use of permits and performance standards will be evaluated. The political process in the adoption of land use controls in this setting will be identified.

Description of Work: Costs and effectiveness of alternative waste disposal systems will be developed. Interregional competition analyses will be reviewed and adopted to estimate "push" effects of restrictive regulations and "pull" effects of exclusive or protective zones. Modifications of economic base analysis or inter-industry analysis will be used to evaluate different mixes of poultry and recreational activities which seem to conflict. Land use controls will be evaluated with respect to the above information and to case situations. Theories of group interaction will be tested against actual political situations encountered in order to evaluate their usefulness in predicting the likelihood of acceptance of administrative solutions to such problems.

4.2

University of Idaho
Agricultural Experiment Station
Moscow, Idaho 83843

METHODS FOR ESTIMATING RECREATIONAL VISITS AND USE ON UNATTENDED SITES

Howard R. Alden
Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objective: To develop and evaluate methods for estimating recreational visits and use on unattended wildland recreation sites.

The project is designed to integrate the development of instruments, instrument and one hundred per cent sampling of recreational visits and use, and regression analysis to derive a method for estimating visits and use on unattended recreation sites. Phase one is allocated to development and evaluation of automatic counting devices and visit and use sample forms. Development of instruments is to be done under the guidance of an electrical engineer followed by laboratory testing at temperature and humidity extremes. Subsequent recreation area testing of placement of counting devices and suitability of sampling forms is to be conducted at a restricted site to permit statistical analysis. The second phase, the development of preliminary visit and use estimation methods, is to continue sampling at a restricted recreation area to permit the application of regression analysis to instrument and one hundred per cent sample data. The third phase, testing of preliminary visit and use estimation methods derived from regression analysis, is to be conducted at recreation areas throughout Idaho. Regression and correlation analysis, applied to instrument and one hundred percent sample data are to be used to derive final visit and use estimation methods.

4.3

Massachusetts Division of Fisheries and Game
Westboro, Massachusetts 01581

HUNTER OBSERVATIONS AND BAG CHECK DATA

Warren W. Blandin
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives:
To provide data that will allow a check to be made on the accuracy of hunter responses to the mail questionnaire survey with respect to the special black duck season.

Procedures:
Hunter observations will be made by State biologists and data recorded on standard hunter performance cards. The observations will be distributed evenly throughout the experimental season. Bag checks will be made as time and circumstances permit, but not at the expense of hunter observations. Standard bag check data cards will be used.

4.4

Michigan State University
East Lansing, Michigan 48823

A REVIEW AND ANALYSIS OF CLASSIFICATION SCHEMES FOR PUBLIC OUTDOOR RECREATION AREAS

Anthony F. Abar
Supported by *Michigan State University*

The purpose of this study is to review and analyze recreational land classification schemes used by agencies, organizations, and individuals in classifying the public recreation lands of the U.S.

The work involves a review of available literature and materials from Federal and State agencies involved in outdoor recreation throughout the country and includes an analysis of past classifications as well as those presently in use. Suggestions concerning the separation of criteria in individual classification systems, the integration of local and State approaches with national classifications, and the establishment of a permanent body to coordinate and guide recreation land classification efforts at all levels, will be investigated.

4.5

Michigan State University
East Lansing, Michigan 48823

CONCEPTS, DEFINITIONS, AND STANDARDS INVOLVED IN THE RECREATIONAL CARRYING CAPACITY OF LAND

Dr Michael Chubb
Supported by *Michigan State University*

This project is primarily concerned with the methodology involved in the concept of the recreation carrying capacity of land and water. An attempt is being made to analyze the various concepts concerned in recreation carrying capacity and to produce a standardized set of definitions that will be useful in both qualitative and quantitative treatments of the problem. A secondary line of investigation concerns a review and comparison of various carrying capacity standards used by different land managing agencies at both a State and Federal level.

This work was commenced in fiscal 1964–65 and will be completed in fiscal 1967-68.

4.6

Michigan State University
East Lansing, Michgan 48823

MICHIGAN OUTDOOR RECREATION DEMAND STUDY

Michael Chubb
Supported by *State of Michigan*

The investigation of the demand for outdoor recreation in Michigan. Since the original agreement did not provide funds for special surveys, the study has had to rely on existing data except in the case of State park day-use where an origin and destination survey was conducted. Park records; forest campground records; boat, fish, and game license records; and many other sources are being used. Major elements of the study are: analyses of research methods, origin models, travel models, destination models (attraction indices), systems models, camping, day-use, fishing, boating, hunting and skiing. Researchers from many fields have been engaged in this study and a number of approaches are being tested.

This study was started in November 1963 and will be completed during fiscal 1966–67. An eight-hundred-page report is now being released.

4.7

Michigan State University
East Lansing, Michigan 48823

OUTDOOR RECREATION PLANNING IN MICHIGAN BY A SYSTEMS ANALYSIS APPROACH; PART III, THE PRACTICAL APPLICATION OF "PROGRAM RECSYS" AND "SYMAP"

Michael Chubb
Supported by *State of Michigan*

This project involves the actual practical application of a computer systems simulation model to Statewide comprehensive recreation planning in Michigan. The theoretical techniques developed in parts I and II of the program by Dr. Ellis will be applied to the problem of Statewide planning and a case study made for one recreational activity. The final report will be a manual which will enable the State to apply the techniques to other activities and to develop a continuous planning process to aid in production of the State Recreation Plan. Boating is being used for the case study.

The technique predicts recreational use at the destination by simultaneously considering population characteristics, transportation linkage resistance, and destination attraction and capacity. This demand is converted to spatial needs and related to present and future supply. Computer-produced maps will show demand, supply and needs.

This project was started in June 1965. The final report on Part III is now in preparation and will probably be published in May 1967.

4.8

Michigan Department of Conservation
Research and Development Division
Lansing, Michigan 48924

STUDY OF METHODS AND PROCEDURES IN GAME HARVEST SURVEYS

Lawrence A. Ryel
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: Develop improved methods and procedures for conducting game harvest surveys.

Procedures: Conduct a continuing study of operations on current surveys. Review methods used in other States and consult with professional survey statisticians when necessary. Visit other agencies conducting similar surveys to study their procedures. Develop statistical models of survey operations and review pertinent statistical theory. Test various methods of improving reliability of game harvest surveys. This might include:

(a) Using previous year's license files to permit contacting selected hunters before the small game or deer season opens.
(b) Testing efficiency of different questionnaire forms.
(c) Checking validity of mail survey responses by comparison with known small game kills on special areas or examining deer at locker plants.
(d) Establishing a list of regular "cooperators" and comparing their success with that of the average hunter to investigate possible use of a combination of such a system with random samples of all licensees.
(e) Devising a means of determining total cottontail rabbit kill since current small game harvest mail surveys must be sent before rabbit season ends.
(f) Investigating reliability of toll booth counts of deer coming across Straits of Mackinac Bridge by means of sample counts.

4.9

Migratory Bird Populations Station, U.S.D.I.
Branch of Wildlife Research
Laurel, Maryland 20801

SPY-BLIND STUDY TO LEARN THE ACCURACY WITH WHICH THE HUNTERS REPORT INFORMATION THROUGH MAIL SURVEYS

Alfred J. Godin
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Study is designed to determine the reliability with which hunters report on wing collection envelopes the time of day that they shoot their birds. A further objective is to determine the reliability with which hunters report crippling loss on the mail questionnaire survey.

From concealment, field co-operators will record on special "Spy-blind" forms, a chronological record of the activities of hunting parties. This will include the time of day, and/or hit but not retrieved. Following an observed hunt, hunters will be given a supply of serially numbered duck wing envelopes and asked to follow the instructions on the envelope and to return one wing from each duck they have shot. Completed "Spy-blind" forms and envelopes will be compared at the Migratory Bird Populations Station to determine the degree of agreement or disagreement in reported time of kill and reported crippling loss.

4.10

Napa State Hospital
Imola, California 94558

THE PRE-HOSPITAL LEISURE-TIME ACTIVITIES OF MENTAL PATIENTS

Irving Babow
Supported by *State of California Department of Mental Hygiene*

This project is the first part of a study to learn how rehabilitation therapists in a mental hospital can assess more effectively patients' rehabilitation needs and how such assessment can aid in program development. The initial phase has these objectives:

1) To develop an instrument for obtaining from the patient and other sources data about his leisure activities and participation in voluntary organizations before hospitalization.
2) To determine how this information can be used in program planning adapted to the individual patient during and after hospitalization.
3) To ascertain the relationship of social class and other demographic variables to the leisure activities and organizational participation of hospital clientele.
4) To provide rehabilitation therapists with social research experience in psychiatric rehabilitation.

4.11

National Bureau of Standards
Washington, D.C. 20234

RECREATION PLANNING

S. H. Wilson
Supported by *Bureau of Standards*

Technical Objective: The objective of this project is to provide data processing assistance to the Bureau of Outdoor Recreation (BOR) in formulating an outdoor recreation plan for the Nation. Tabulations of recreation activities, facilities, and potentialities are made for analysis of present and future recreational needs and of such questions as the relationship of supply and demand. Based upon this analysis, the Nationwide Plan will recommend policies and programs designed to meet recreation needs.

Approach: To provide the tabulations requested by BOR, an automatic data processing system was designed to build and maintain a file of information on existing and potential outdoor recreation areas administered by public agencies. Three special forms were designed to collect this information and were distributed to BOR State and Regional offices. When the forms were returned, the data were transferred to punched cards and then to magnetic tape. Computer programs are being written to produce the various tabulations requested by BOR. A major problem has been to obtain complete and accurate information from the Regional Offices, so that the data bank is updated as additions and corrections are supplied.

4.12

State University of New York at Syracuse
College of Forestry
Syracuse, New York 13210

DEVELOPMENT OF CONCEPTUAL FRAMEWORK FOR ALLEGHENY PLATEAU STUDIES

P. Graves

Supported by *State University of New York at Syracuse*

Objective: To formulate a workable program for land-use planning studies involving consideration of regional recreation requirements and changes in New York's economic and social structure, particularly those relating to urban-rural interrelationships.

Progress of Principal Research Accomplishments during 1965: Work was initiated late in the year. Problem analyses and other pertinent information were reviewed, consultation started with State officials; county planners, and others concerning requirements of a meaningful research program.

Work Planned for 1966 Calendar Year: To continue discussions with public officials and others concerned with the College's Allegheny Plateau research program, and to prepare a report containing a workable guide for such work.

4.13

College of Forestry
State University of New York
Syracuse, New York 13210

THE USE OF EYE PUPILLARY RESPONSE IN FOREST AESTHETIC STUDIES

Wiley D. Wenger, Jr.

Supported by *State Univ. of New York at Syracuse*

Objective: To test use of eye pupillary response as a method for reliable and valid measurements of aesthetic responses to forest scenery. Specifically sought is an improved method to answer questions about what visual aspects of scenery that classes of persons find attractive and repulsive. Pupillary response has been reported to be a sensitive, objective measure of attitudinal response. This research relates pupillometrics as a technique for attitude study to the concerns of environmental psychology and forest management for recreation.

Procedures: Subjects will be selected on the basis of social and psychological characteristics. They will be shown slides of forest scenes with varying characteristics thought relevant to scenic quality. While viewing experimental and control slide pairs, subjects' eyes will be photographed at two frames per second under controlled conditions. Pupillary size measured from films will be summarized and analyzed to determine: (1) if significant pupillary responses occur in photographs of relatively common scenery, (2) if broad psychological and social classes purportedly relevant to aesthetic appreciation differ significantly in response to the stimuli, and (3) what the technical problems are in use of the method of this type of research.

4.14

North Carolina Wildlife Resource Commission
Box 2919
Raleigh, North Carolina 27602

THE RELIABILITY OF PARTIAL CREEL CHECKS AS ESTIMATORS OF SEASON TOTALS

Frederic T. Fish

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

The objective of this job is to determine the value of certain types of partial creel census in estimating total season pressures, catches, and catch rates.

Three Wildlife Management Area trout streams, on which a complete creel census has been maintained, will be selected: the first (Davidson River) a large, heavily fished stream; the second (North Fork French

Broad) a small, lightly fished stream; and the third (Lost Cove) one on which "native trout" restrictions have been in force.

The complete creel census for each stream in terms of total number of fisherman-trips, total hours of fishing pressure, and total trout catch are known and will be tabulated—and the over-all hourly catch rate calculated—for each day of the past three fishing seasons.

The statistical accuracy of estimates of these season totals for factors in question based upon data projections from various combinations of systematic partial census obtained by use of the same data then will be determined. Among the partial creel censuses to be tested will be: (1) alternate open days beginning on opening day; (2) alternate open days excluding opening day; (3) specific week days; (4) every second day in rotation; (5) every third day in rotation; and (6) proportional to estimated pressure. Data projection will include the most probable season total with its 95 percent confidence limits—for comparison with the known totals. Initially, the study will be based upon 1965, 1964, and 1963 creel census data.

4.15

University of Michigan
Ann Arbor, Michigan 48104

COOPERATIVE FOREST RECREATION RESEARCH UNIT WITH THE UNIVERSITY OF MICHIGAN

James T. Morgan

Supported by *U.S.D.A., Forest Service*

Object: To stimulate and guide graduate student research in forest recreation by demonstrating needs, helping to plan work, arranging for research facilities, providing the financial aid, and coordinating the efforts of different institutions. To increase the supply of people qualified to do forest recreation research.

Plan of Work: There will be three main lines of activity: (1) helping to mobilize the resources of the university and the Forest Service (FS) to do more and better recreation research; (2) helping graduate students in particular studies; and (3) doing research on special problems. The project leader will contact university faculty members and students to learn their special interests and abilities and to acquaint them with opportunities for productive research. He will help to formulate research plans and serve as an advisor and coordinator for ongoing efforts. He will recommend to the Forest Service projects deserving of cooperative aid and serve as liaison with Federal land agencies in procuring research areas and facilities. Special problems to be investigated include evaluation of visitor's information services and appraisal of the effects of interpretive programs on recreationists.

4.16

Ohio Division of Wildlife
1500 Dublin Road
Columbus, Ohio 43212

TELEPHONE SURVEY OF GAME HARVEST AND HUNTING PRESSURE

Kenneth R. Russell

Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Objectives: To measure harvest and hunting pressure by physiographic and forest region.

Background: 1. Reliable estimates of both game harvest and hunting pressure in absolute terms as well as rates are in continuing need for effective harvest management. As great as the need for this type of information might be, no fully acceptable method for drawing a representative sample which will reflect the actual phenomenon taking place has ever been devised and probably never will be. The field bag check and the mail questionnaires have both been used extensively but each has serious disadvantages. These for the most part are in areas of drawing a representative sample, obtaining reliable data from the respondent or excessive cost incurred in order to obtain accurate data from a representative source.

2. The ultimate goal in measuring hunting pressure and harvest rates would be a detailed record of all of the hunting activities of each hunter in the State. This, of course, is impossible so a compromise must be made. Since the source of data to estimate hunting pressure and harvest rates lies with the hunter rather than game populations, a listing of all telephone exchanges and the number of subscribers in each will be obtained from telephone company sources. A random sample of these exchanges will be drawn with subsequent samples of columns drawn from the pages of the selected directories. Plans include addition of three Statewide direct dial telephone lines to the Department of Natural Resources Centrex board in the Ohio Department Building.

3. Several distinct advantages accompany the use of the telephone survey technique. These include (a) potential contact with 85 percent of the hunting population by a small number of census takers; (b) sampling any location of the State from one central sampling point; (c) sampling both the licensed and unlicensed current hunting population; (d) contacting a large sample over a relatively short time period;

(e) utilizes a spontaneous and consequently less biased response on the part of the respondent; (f) reduces respondent bias experienced with in-person contacts; (g) yields a high rate of usable returns from the hunters contacted; (h) is relatively inexpensive per contact made.

4. As a result of the many advantages offered by the telephone survey technique, the following described procedure will be employed to estimate hunting pressure and harvest characteristics in Ohio during the 1965–66 hunting season.

Procedures: 5. A stratified random sample of residential telephone subscribers will be drawn to permit estimates, with known confidence limits, of harvest rates and hunting pressure to be projected for absolute estimates according to physiographic and forest region.

6. The survey period will begin September 16 and will continue through two weeks past the close of the grouse and fur season in late February. A separate sample will be drawn and separate survey taken of approximately 10,000 names bi-monthly during the survey period. Drawn names will be returned to the sampling universe and could be included in subsequent drawings. The respondents will be queried on their hunting activities for the most recent half-month only, number of hunts, species hunted, take by species, duration of hunts, and location of hunts. It is estimated that each 10,000 sample unit will yield between 800 and 1,000 households with hunters. Resulting data will be tabulated at the Olentangy Wildlife Experiment Station and appropriate statistical tests will be applied.

4.17

Oklahoma State University
Agricultural Experiment Station
Stillwater, Oklahoma 74074

DEMAND FOR RECREATION IN THE WILDHORSE CREEK WATERSHED

Daniel D. Badger

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives:

1. To develop appropriate economic models and methodological procedures applicable to recreation demand analysis for the recreational complex in the Wildhorse Creek Watershed.
2. To assemble primary and secondary data on population, miles traveled, money spent, incomes, hours worked, and other variables needed to estimate the demand for outdoor recreation in the selected area.
3. To estimate demand for both local and nonlocal recreation from which projections will be made as to the number of visitors using the facilities in the Wildhorse Creek Watershed.

Procedure:

Major emphasis will be placed on developing methodological procedures and appropriate models for analyzing the data. The various models will be studied and the best techniques will be used to measure the demand for recreation. Basic data on population, income, occupations, hours worked and hours of leisure time, transportation networks, mobility, etc. will be obtained from tourist surveys, city records and published data. Concentric distance zones from the Stephens County recreational complex will be established and visitors to the various zones determined. A sample of the users of the various recreational facilities will be surveyed by a questionnaire structured to obtain information on the projected use of all facilities. These will be analyzed by several of the best developed techniques to derive effective demand schedules for the recreational facilities in the area.

4.18

Department of Highways
Downsview, Ontario, Canada

RECREATIONAL TRAVEL STUDY—"CARBON TRACER" QUESTIONNAIRE

Roy I. Wolfe

Supported by *Department of Highways, Ontario (D.H.O.) Research Branch*

The Recreation and Travel Study was instituted in 1964 and is a continuing project that draws on the support of other provincial departments and through the Joint Highway Research Program, of various universities in Ontario. The present status of the study is described in "Parameters of Recreational Travel: A Progress Report," which will be published in the 1965 *Proceedings* of the Canadian Good Roads Association, Ottawa.

The "carbon tracer" questionnaire will be submitted to a sample of visitors to Ontario Provincial Parks during the summer of 1966; every time a member of the sample enters any Provincial Park throughout the season he will be questioned anew about his travel habits and recreational activities since his previous visit. Thus, for the first time, it will be possible to trace a body of recreationists through the Parks system throughout the season. The information thus obtained will be mathematically treated, by means of the opportunity model, factor analysis, etc., in the hope that a more accurate predictive tool for Park travel will be devised than has yet been achieved.

4.19

Sandy Hook Marine Laboratory, U.S.D.I.
Highlands, New Jersey 07732

1965 SALT-WATER ANGLING SURVEY

John Clark
Supported by *Bureau of Sport Fisheries and Wildlife, U.S.D.I.*

Supply information and plan layout for interview forms to be used by Bureau of Census for Nationwide survey of information on species, numbers, weights, areas and methods of fishing for salt water game fishes. Provide a list of primary and secondary game species for each sampling area. Assist the Bureau of Census in solving taxonomic problems in field canvass data. From compilations furnished by the Bureau of Census, prepare a complete data report for publication. Discuss results with appropriate fish and game officials where necessary.

4.20

Southeastern Forest Experiment Station
Research Triangle Park, North Carolina 27709

COOPERATIVE FOREST RECREATION RESEARCH AT NORTH CAROLINA STATE UNIVERSITY

Stephen J. Maddock
Supported by *Forest Service, U.S.D.A.*

Object: To promote and guide graduate study and research in forest recreation; and to develop guides to achieve maximum recreation benefits from commercial forests of the Piedmont and Southern coastal plain.

Plan of Work: The project leader will act as advisor for programs of graduate study related to outdoor recreation. Capable students will be recruited from the North Carolina State University and other nearby universities. Research by the project leader will seek to find the place and extent of the recreation potential of Southeastern commercial forests.

4.21

Southern Illinois University
Carbondale, Illinois 62901

INFORMATION CENTER—RECREATION FOR THE HANDICAPPED

Dr. William H. Freeberg
Supported by the *Vocational Rehabilitation Administration, HEW*

THE INFORMATION CENTER—RECREATION FOR THE HANDICAPPED will focus its attention primarily upon the gathering of data and all kinds of literature, films, tapes, and other devices and materials associated with the conduct of recreation programs for the retarded. These activities and materials would be related to such camping and recreational activities as swimming, arts and crafts, nature study, campfire programs, music, drama, dance, hiking, formal exercises, etc. These items will be carefully scrutinized and edited and those cases where materials meet the professional standards will be made available for distribution within the limits of the budget.

It is the hope that as a camp program evolves throughout the United States, that this center will serve the needs of stimulating the improvement of existing programs and to encourage the development of new camp programs. I strongly feel because of Southern Illinois University's extended experience in camping for the handicapped and the University's programs in special education and rehabilitation, the public information center should be located here. These recreational programs are basic to the growth and development of handicapped individuals towards a constructive, useful and productive life.

4.22

Southern Illinois University
Carbondale, Illinois 62901

SPECIAL SERVICES—RECREATION FOR THE HANDICAPPED

William H. Freeberg
Supported by *Vocational Rehabilitation Administration, HEW*

This proposed project will contribute to filling an acute need in the field of recreation for the handicapped in the following manner:

1. By determining specific needs in the field by use of a questionnaire. This questionnaire will cover 13 selected categories.
2. By tabulating the above requests periodically and then encouraging qualified persons to contribute information in these various categories.
3. By reviewing all written materials in the field and digesting them into "Recommended Readings" for distribution.
4. By visiting communities that have recreation programs functioning and preparing digests of these programs into "Recommended Programs" for distribution.
5. By soliciting information regarding activity procedures from successful existing programs and preparing digests entitled "Recommended Procedures" for distribution.

6. By continuing to publish the Newsletter as the means of publicizing existing programs and new materials in the field.

7. By annually updating the bibliography for those who wish to explore the field in depth.

4.23

U.S. Army Engineer District, Sacramento
650 Capitol Mall
Sacramento, California 94102

RECREATION DESIGN CRITERIA AND DEMAND

Dale Crane

Supported by *Office of Chief of Engineers, Civil Works Directorate, Washington, D.C.*

Objectives: To develop methodology and techniques for forecasting recreation demand; to develop standards for translating recreation demand into terms of requisite water and land resources/facilities for project formulation and design.

Study Plan:

1. In anticipation of this research study, arrangements have been made to collect recreation use data at Corps projects on visitation, activities, origin of visitors, fees paid, and duration and frequency of visits.

2. The foregoing data will be merged with allied data and analyzed in a model consisting of the following major elements:
    a. Location, capacity, and quality of Corps project.
    b. Locus of competing and complementary recreation areas.
    c. Origin of visitors using the Corps project.
    d. Fees and inputed costs of visits.
    e. Locus of urban areas in the service area of the project.
    f. Least cost alternatives for Corps project.

3. Translate results of foregoing analysis into:
    a. Structuring area of influence of proposed projects.
    b. Determining scale and mix of recreation developments associated with Corps projects.
    c. Provide a framework for identifying and evaluating least cost alternatives.
    d. Provide a framework for forecasting future trends in outdoor recreation activities.
    e. Provide further insights into quantifying recreation benefits.

4.24

Utah State University
Agricultural Experiment Station
Logan, Utah 84321

RECREATION USE BY SAMPLE COUNTS AND CONTINUOUS RECORDS

S. R. Tocher

Supported by *Cooperative State Experiment Station Service, U.S.D.A.*

Objectives: To develop

1. Regression analysis procedures for predicting amounts of recreation use at specific locations within the complex.

2. Regression analysis procedures for predicting patterns of use at specific locations within the complex.

Description of Work:

Establish through instrumentation a continuous record of the number of vehicles within a closed recreation complex (Logan Canyon) at any hour. With additional instrumentation and subsampling at specific sites, the number of visitors and the activities in which they engage will be recorded. Regression analysis procedures will be used to relate the number of vehicles within the complex at any hour to the amount of use and activity at specific sites.

4.25

College of Natural Resources,
Utah State University
Logan, Utah 84321

A TEST OF PRINTOUT TRAFFIC COUNTERS FOR ESTIMATING VISITOR USE AT RECREATION AREAS

J. Alan Wagar

Supported by *Forest Service, U.S.D.A.*

This study uses printout traffic counters and sample counts of recreational use to estimate the amount of visitor use in each activity on a recreation area. The counter records, on paper tape, the number of vehicles present each hour. Regression methods are used to relate on-the-hour records of vehicles present to on-the-hour sample counts of visitor use. Relationships are then used to estimate visitor use for an entire season.

4.26

Utah State University
Logan, Utah 84321

VEGETATIVE RESPONSE TO NINE PATTERNS OF SIMULATED RECREATIONAL USE

J. Alan Wagar

Supported by *Forest Service, U.S.D.A.*

The objective of this study is to determine the effectiveness of simulated trampling as a technique for recreation research. The response of vegetation is compared for 9 combinations of 3 intensities and 3 timings of simulated trampling. Trampling is simulated with a cleated roller. The response of vegetation is measured with a grid of squares and by clipping and weighing.

4.27

University of Washington
Seattle, Washington 98105

SELECTION OF THE OPTIMUM METHOD FOR ESTIMATING THE DEMAND FOR NON-MARKET WATER RESOURCES WITH INCOMPLETE INFORMATION

Gardner Brown

Supported by *Office of Water Resources Research, U.S.D.I.*

The principal purpose of this study is to estimate future water demand for selected non-market water oriented resource uses in Washington State. Thus it is first necessary to identify the most appropriate methods for estimating present and future demand for water resource related activities such as the demand for water based recreation—boating, water sports, and angling; the demand for habitat for feeding, nesting and breeding of migratory water fowl; and the demand for water quality.

A related objective is to recommend the type of data which should be collected if superior analytical techniques are to be applied in the future. It is expected that in the course of this study, certain demand estimation methods will be found which are clearly superior to others, yet cannot be used because the required information is not available. On the other hand, the use of a wider range of estimation techniques will be feasible because hitherto unavailable quantitative data will be provided by the State of Washington Water Research Center preliminary analysis of future water demand, of which this study is a part, and similar studies being conducted by other public agencies.

II. PERFORMING ORGANIZATIONS

Alabama Department of Conservation—1.1, 2.1, 2.2.
Alaska Department of Fish and Game—1.2, 1.3, 2.3.
Alaska, University of—1.4.
Arizona Game and Fish Department—1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 2.4.
Arizona Outdoor Recreation Commission—1.11.
Arizona, University of—1.12, 2.5.
Auburn University—3.1.

Barton-Aschman Associates Inc.—1.13, 1.14.
Bourquard, E. H. and Associates—1.15.

California Department of Fish and Game—1.16, 1.17.
California, University of—1.18, 3.2, 3.3, 3.4.
Clemson University—1.21.
Colorado Game, Fish and Parks Department—1.23, 1.24, 1.25, 1.26, 1.28, 2.6.
Colorado State University—1.29, 1.30, 1.31, 1.32, 3.5.
Comeback, Inc.—1.33, 1.34.
Connecticut Fish and Game Commission—1.35.
Connecticut, University of—1.36, 2.8.
Cornell University—1.37, 1.38, 1.39, 1.40, 1.41, 1.42, 1.43, 2.9, 3.6, 4.1.

Delaware, University of—2.10, 2.11.
Duke University—2.12.

Florida Fish and Game Commission—1.44, 1.45, 2.13, 2.14, 2.15.
Florida, University of—2.16.

Georgia Game and Fish Commission—1.47.
Georgia, University of—1.47, 1.48, 1.49, 1.50, 1.51, 1.52, 1.53, 1.54, 2.17, 2.18, 2.19, 2.20, 2.21, 2.22, 3.7, 3.8.

Harvard University—1.55.
Hawaii-Planning and Economic Development Commission—1.56.
Hawaii, University of—1.57.
Humbold State College—1.58.

Idaho Fish and Game Department—2.23, 2.24.
Idaho, University of—4.2.
Illinois Natural History Survey—1.59.
Illinois, University of—1.60, 2.25.
Intermountain Forest & Range Expt. Sta.—1.201.
Iowa State University—2.27, 3.9.

Kansas Forestry, Fish and Game Department—1.61.
Kentucky, University of—3.10.

Louisiana State University—1.62, 3.11.
Louisiana Wildlife and Fish Commission—1.63.

Maine Department of Inland Fisheries and Game—1.64, 2.26.
Maine, University of—1.65.
Maryland Department of Game and Inland Fish—1.66.
Maryland, University of—1.67, 1.68, 2.28, 3.12.
Massachusetts Division of Fish and Game—1.69, 2.29, 2.30, 4.3.
McDonald Training Center—1.72.
Miami, University of—1.73.
Michigan Department of Conservation—2.32, 2.33, 4.8.
Michigan State University—3.14, 3.15, 4.4, 4.5, 4.6, 4.7.
Michigan, University of—1.74, 1.75, 1.76, 1.77, 1.78, 1.79, 1.80, 1.81, 2.34, 2.35, 2.36, 2.37, 2.38, 2.39, 3.16, 4.15.
Migratory Bird Population Station—4.9.
Minnesota Conservation Department—1.85.
Minnesota Division of Fish and Game—1.86, 1.87.
Minnesota, University of—1.88, 1.89, 1.90, 3.17.
Mississippi Game and Fish Commission—1.91.
Mississippi State University—1.92, 1.93.
Missouri, University of—2.40, 2.41, 3.18, 3.19.
Montana Fish and Game Department—1.94, 1.95, 1.96, 1.97.
Montana State University—2.43.
Montana, University of—1.101, 1.102.

Napa State Hospital—4.10.
National Bureau of Standards—4.11.
National Recreation and Park Association—1.103, 1.104, 1.105.
National Rifle Association of America—1.106.
Nevada Fish and Game Commission—1.107, 1.108, 1.109.
Nevada, University of—2.44, 3.20.
New Hampshire Fish and Game Department—2.45.
New Hampshire, University of—2.46, 2.47.
New Jersey Division of Fish and Game—2.48, 2.49, 2.50, 3.21.
New Mexico Department of Game and Fish—1.10, 1.11, 1.12, 2.51, 2.52, 2.53, 2.54, 2.55.
New Mexico State University—1.114, 1.115, 2.56, 3.22.
New Mexico, University of—1.116.
New York City Youth Board—2.57.
New York State Conservation Department—2.58, 2.59, 2.60.
New York Water Resources Commission—1.117.
New York, State University of—1.118, 1.119, 4.12, 4.13.
North Carolina State University—2.61.
North Carolina, University of—1.123.
North Carolina Wildlife Research Commission—1.120, 1.121, 1.122, 2.62, 4.14.
North Carolina Wildlife Resources Commission—2.81, 2.82.
North Central Forest Experiment Station—1.124, 4.15.
North Dakota State Outdoor Recreation Association—1.125.
North Dakota State University—3.24.
Northeastern Forest Experiment Station—1.127, 1.128.
Northern Arizona University—1.129.

Ohio Division of Wildlife—1.130, 2.64, 2.65, 2.66, 4.16.
Ohio State University—2.67, 3.25, 3.26, 3.27.
Oklahoma Department of Wildlife Conservation—1.131, 2.68, 2.69, 2.70.
Oklahoma State Highway Department—1.132.
Oklahoma State University—2.71, 3.28, 4.17.
Ontario Department of Highways—4.18.
Ontario Public Service Commission—2.72.
Oregon State University—1.133, 1.134, 2.73, 3.29.
Pacific Northwest Forest Experiment Station—1.136.
Pennsylvania State University—2.74, 2.75, 2.76, 3.30.
Pennsylvania, University of—1.138.
Puerto Rico, University of—1.139.
Purdue University—1.140, 3.31, 3.32.

Remington Arms, Inc.—1.141.
Research Triangle Institute—1.142.
Rhode Island, University of—1.144, 2.77, 3.33, 3.34.
Rutgers University—1.145, 1.146, 1.147.

San Jose State College—2.78, 3.35.
Sandy Hook Marine Laboratory—4.19.
Smithsonian Institution—2.79.
South Dakota Department of Game and Fish and Parks—2.80.
South Dakota State University—1.148, 1.149, 1.150, 3.36.
Southeastern Forest Experiment Station—1.143, 1.151, 2.81, 2.82, 4.20.
Southern Illinois University—1.152, 1.153, 1.154, 3.37, 4.21, 4.22.
Stephen F. Austin State College—1.155, 1.156.
Syracuse University—2.83.

Tennessee Game and Fish Commission—2.84.
Tennessee, University of—1.157, 2.85, 3.38, 3.39, 3.40, 3.41, 3.42 3.43, 3.44, 3.45, 3.46, 3.47, 3.48, 3.49.
Texas A & M University—1.159, 3.50.
Texas Parks and Wildlife Department—1.160, 1.161, 1.162, 1.163, 1.164, 1.165, 1.166, 1.167, 1.168, 1.169, 1.170, 1.171, 1.172, 1.173, 1.174, 1.175, 1.209.
Travel Research International—2.86.

U. S. Army Engineers—4.23.
U. S. Bureau of Outdoor Recreation—1.176, 1.177, 1.178, 1.179, 1.180, 1.181, 1.182, 1.183, 1.184, 1.185, 2.87, 3.52, 3.53, 3.54.
U. S. Bureau of Sport Fisheries & Wildlife—1.186, 2.81, 2.82.
U. S. Department of Agriculture—1.187, 1.188, 2.7, 3.51, 3.55, 3.56, 3.57, 3.58, 3.59, 3.60.
U. S. Federal Water Pollution Control Administration—1.189.
U. S. Forest Service—See Experiment Stations
U. S. Geological Survey—1.190, 1.191, 1.192.
U. S. National Park Service—1.193.
Utah Department of Fish and Game—1.194, 2.89.
Utah State University—1.195, 1.196, 1.198, 1.199, 1.200, 1.202, 2.90, 2.91, 3.61, 3.62, 3.63, 4.24, 4.25, 4.26.

Vermont, University of—1.203, 1.204, 2.92, 3.64, 3.65, 3.66, 3.67.

Washington, University of—4.27.
Waterloo Lutheran University—2.93, 3.68.
West Virginia Department of Mental Health—2.94.
West Virginia University—1.205, 2.95, 2.96, 3.69.
Weston, Roy F., Inc.—1.206.
Wisconsin Conservation Department—2.97, 2.98, 2.99.
Wisconsin, University of—1.207, 3.70, 3.71.
Witwatersrand, University of—2.100.
Wyoming Game and Fish Commission—1.208, 2.101.
Wyoming, University of—3.72.

III. PRINCIPAL INVESTIGATORS

Abar, Anthony F.—4.4.
Alden, Howard R.—4.2.
Alexander, P. M.—1.21.
Alexander, R. K.—1.113.
Allee, David J.—1.37, 1.40, 2.9, 3.6, 4.1.
Anderson, Jackson M.—1.89.
Anderson, Kenneth—1.64.
Arner, Dale H.—1.92.

Babow, Irving—4.10.
Badger, Daniel D.—2.71, 4.17.
Bangerter, Arnold—2.89.
Barlow, John—1.39.
Barron, John C.—1.72, 1.73.
Bartoo, R. A.—2.74.
Beazley, Ronald I.—1.154.
Benson, Robert—1.87.
Beshears, W. W.—2.2.
Bevins, Malcolm I.—1.204.
Bianchi, Donald R.—1.99.
Bird, Alan R.—3.60.
Bird, Ronald—3.19.
Birkeland, C. J.—1.60.
Black, C. T.—2.33.
Bond, Carl E.—1.134.
Bond, Robert S.—2.31.
Bondurant, John H.—3.10.
Bonn, E. W.—1.167, 1.168.
Bottum, John S.—3.26.
Brewer, Durward—2.41.
Brickler, Stanley K.—1.153.
Briggs, Philip T.—2.58, 2.59.
Bristow, Bud—1.8, 1.9, 1.10.
Bromilow, F.—1.114.
Brown, Dennis L.—1.166.
Brown, Gardner—4.27.
Brown, R. F.—1.191.
Brownlee, Sam—1.169.
Bruce, James R.—1.7.
Bury, Richard L.—1.129.
Bylund, H. Bruce—2.90.

Callahan, J. C.—3.31.
Calvin, Lyle D.—2.73.
Campbell, Howard—1.111, 1.112.
Cargo, David G.—1.67.
Carter, E. C.—3.69.
Carter, W. R.—1.66.
Cary, Richard E.—3.15.
Caskey, Alan R.—2.25.
Champlin, James R.—1.48, 1.49.
Cheney, W. R.—1.82, 1.83.
Christensen, Linda—3.35.
Chubb, Michael—4.5, 4.6, 4.7.
Clark, John—4.19.
Clement, Charles D.—2.19.
Cole, Gerard L.—2.10, 2.11.
Coleman, E. W.—1.91.
Collins, Paul E.—1.148.
Conklin, H. E.—1.42.
Copeland, Lewis C.—3.38, 3.39, 3.40, 3.41, 3.42, 3.43, 3.44, 3.45, 3.46, 3.47, 3.48, 3.49.
Copp, James H.—2.75.
Corsi, Rex—1.208.
Cox, Rex W.—3.24.
Craighead, John J.—1.101, 1.102.
Crane, Dale—4.23.
Crider, E. Dale—1.44.
Crowell, Thomas E.—2.62.
Curtis, Ben C.—1.5, 1.6.

Daley, Stanley—1.85.
Dambach, Charles—3.27.
Daniel, Walton S.—1.165.
Danielsen, Albert L.—2.17.
Danielson, R. E.—1.29.
Davidson, Paul—1.146.
Davis, James R.—1.63, 1.120.
Davis, William C.—2.4.
Downing, Robert L.—2.81, 2.82.

Erickson, Jack—1.130.
Escarrey, Donald—3.7.

Faber, Lester F.—1.176.
Farnham, William H.—1.38.
Ferkovich, Paul—2.51.
Fischer, Paul—1.170.
Fish, Frederic F.—1.122, 4.14.
Florschutz, Otto—1.121.
Floyd, Charles F.—2.18.
Follis, Billy J.—1.171.
Foster, John H.—3.13.
Franklin, R. T.—2.21.
Freeberg, William H.—4.21, 4.22.
Friesurgh, S. H.—1.103.
Frissell, Sidney S.—1.90.
Fromme, Joseph T.—1.178.
Gadger, Daniel D.—3.28.
Gaffney, John J.—1.94.
Garfield, Morton J.—3.52, 3.53, 3.54.
Gasaway, Charles—1.131.
Gates, John W.—3.72.
George, J. L.—3.30.
Giesbrecht, Herbert—1.79.
Gill, John D.—2.26.
Gilmore, Alden S.—1.72.
Godin, Alfred J.—4.9.
Gould, Ernest M.—1.55.
Granstrom, Marvin L.—1.145, 1.147.
Gratto, Charles—2.77.
Graves, P.—1.118, 1.119, 4.12.
Gray, James R.—1.115, 2.56, 3.22.
Green, Bernal L.—3.32.
Gregory, G. R.—2.39.
Gruenewald, Roger J.—1.11.

Haas, Raymond M.—2.95.
Haines, Richard—1.35.
Halter, Albert N.—1.33.
Hamilton, L. S.—1.41.
Handley, Rolland B.—1.183.
Hansen, Henry L.—1.88.
Hanson, Ivan—3.57.
Hanzel, D. A.—1.98.
Harmston, F. K.—3.18.
Harper, Harold T.—1.17.
Harrison, James S.—2.55.
Hartesveldt, Richard J.—2.78.
Hartley, Ernest—2.12.
Harwig, Susan—2.57.
Haugen, Arnold O.—2.27.
Havlick, Spenser W.—1.78.
Heckart, Larry—1.3.
Helfinstine, Rex D.—3.36.
Hendee, John C.—1.136.
Henderson, George G.—1.209.
Hendrickson, G. E.—1.190.
Hengsback, Jeffrey L.—1.65.
Heyl, R. James—1.51.
Higman, James B.—1.73.
Hill, Beatrice H.—1.34.
Hoch, Irving—3.2.
Hoffman, Donald M.—1.24.
Hopper, Richard M.—1.23, 1.25, 1.26, 1.27.
Horvath, Joseph C.—1.84.
Hunt, John D.—1.200, 2.91, 3.61, 3.62, 3.63.
Hunt, Robert—2.89, 2.99.

Inman, Buis T.—3.51.

Jahns, Irwin R.—1.68.
James, G. A.—1.151.
Jeffrey, Arthur—3.33.
John, M. E.—2.76.
Johnson, Hugh A.—3.55, 3.56.
Johnson, James—1.110.
Johnson, R. L.—1.96, 1.97.
Jones, F. K.—2.13, 2.14, 2.15.
Joyner, H. R.—1.14.

Kearns, Frank W.—1.4.
Keating, James F.—2.23, 2.24.
Keeling, William B.—1.52, 1.53, 1.54.
Kelly, H. D.—1.1.
Kempinger, James—2.97.
Kern, Edward E.—3.1.
Ketchledge, E. H.—2.83.
Kilborne, Stewart R.—1.117.
King, David A.—2.5.
Klein, W. D.—2.6.

Lacaillade, Harold C.—2.45, 2.46.
Landgren, Norman E.—1.128.
Lapage, Wilbur—1.127.
Larimore, R. Weldon—1.59.
Leiser, Andrew T.—1.19.
Lentnek, Barry—2.67.
Lewis, John E.—3.68.
Lindsay, John J.—3.66.
Little, James D.—2.84.
Little, Ralph G.—2.54.
Lockard, Dale—1.107.
Loomer, C. W.—3.71.
Lord, W. B.—3.70.
Lucas, Robert C.—1.201.
Lueth, Francis X.—2.1.
Lungstrass, Hanns W.—2.72.
Lyons, James M.—1.125.

Mace, Paul—2.70.
Macgillivray, C. I.—1.140.
Maddock, Stephen J.—1.143, 4.20.
Maguire, H. F.—2.60.
Mangold, Robert E.—2.48, 3.21.
Mark, Shelley M.—1.56.
Martin, Joe A.—2.85.
Matson, Arthur J.—1.149.
Matthyssee, J. G.—1.43.
McCaig, Robert S.—1.69.
McCann, James A.—1.70, 1.71.
McConnell, C. H.—1.15, 1.206.
McCully, W. G.—1.159.
McCurdy, Dwight R.—3.37.
McDermid, Robert W.—1.62, 3.11.
McDonough, James—2.29.
McGann, Muriel F.—1.104.
McGowan, Terry A.—2.3.
McIntosh, Kenneth D.—2.96.
McKain, Walter C.—2.8.
McNall, Warren J.—2.52.
Meiman, James R.—1.30.
Menn, C. T.—1.162, 1.163.
Merrill, George W.—2.53.
Moody, Harold L.—1.45.
Morgan, James T.—1.124, 4.15.
Morrison, Charles C.—2.87.
Moss, William T.—2.22, 3.8.

Muhlenberg, Nicholas—1.138.
Munger, James A.—2.7.
Murison, William F.—1.58.
Murphy, Richard E.—1.116.
Myers, Gary T.—1.28.
Myles, George A.—2.44.

Nagel, Hohn E.—1.194.
Nisbet, William A.—1.109.

Ordal, Norman—1.86.

Palmer, C. M.—1.89.
Parsons, James J.—1.18.
Patton, Dwight L.—1.177.
Peattie, Robert A.—2.86.
Pilcher, Milton A.—1.184.
Pinkas, Leo—1.16.
Prell, Arthur Ely—1.152.
Priddle, George B.—2.93.
Pushee, George F.—2.30.

Raup, Philip M.—3.17.
Reis, John N.—2.66.
Rennebohm, William E.—1.185.
Roberts, Leland E.—2.69.
Roguski, Eugene—1.2.
Rorholm, Niels—3.34.
Russell, Kenneth R.—2.64, 2.65, 4.16.
Ryel, Lawrence A.—2.32, 4.8.

Santiago-Vazquez, Antonio—1.139.
Sargent, Frederic O.—1.203.
Scherr, Merle S.—2.94.
Schlebecker, John T.—2.79.
Schoenthal, Norman D.—1.150.
Schoonover, Roy E.—1.61.
Shafer, Elwood L.—2.63.
Shapley, S. Philip—1.75.
Sharp, Robert H.—1.182.
Sharpe, F. Phillip—1.32.
Sharpe, Grant W.—1.74, 1.76, 1.77, 1.80, 1.81, 2.34, 2.35, 2.36, 2.37, 2.38, 3.16.
Shivers, Jay S.—1.36.
Shoemaker, William—2.50.
Silson, John E.—1.33.
Sitton, Gordon R.—3.29.
Smith, Dwane Q.—1.161.
Smith, Robert L.—1.205.
Smith, Stephen C.—3.5.
Solberg, Erling D.—1.187.
Spaulding, Irving A.—1.144.
Spence, Liter—1.100, 2.42.
Staniforth, Sydney D.—1.207.
Stoltenberg, C. H.—3.9.
Stott, Charles C.—2.61.
Street, James A.—1.142.
Sumner, Robert C.—1.108.
Swinford, K. R.—2.16.

Tamimi, Y. N.—1.57.
Tharp, Max M.—3.58, 3.59.
Thompson, John R.—1.50, 2.20.
Thompson, Lloyd F.—2.80.
Thompson, Morton—1.105.
Thor, E.—1.157.
Thoreson, Nels A.—1.95.
Tocher, S. R.—1.198, 1.199, 4.24.
Toole, Joe E.—1.160, 1.175.
Tourine, Frank—2.49.
Tuthill, D. F.—3.12.
Twardzik, Louis F.—3.14.
Twiss, Robert H.—3.4.
Tybout, Richard A.—3.25.

Vick, Norman G.—1.186.
Vlasin, Raymond D.—3.57.
Volk, Donald J.—2.28.

Wagar, J. Alan—1.196, 1.202, 4.25, 4.26.
Wagner, D. J. M.—2.100.
Webster, Clark C.—1.141.
Wenger, Alan G.—1.174.
Wenger, Wiley D.—4.13.
Westveld, R. H.—2.40.
Whaley, R. S.—1.195.
White, Richard L.—1.164.
Whittaker, James—1.128.
Wilcox, A. T.—1.31.
Wilson, Andrew W.—1.12.
Wilson, S. H.—4.11.
Wise, Louis N.—1.93.
Wolfe, Roy I.—4.18.
Wood, Thomas J.—1.155, 1.156.
Woodhouse, W. W.—1.123.
Wooten, A. B.—3.50.
Wrakestraw, George F.—2.101.
Wright, John C.—2.43.
Wyatt, Herbert—1.47.
Wyckoff, J. B.—3.20.

Young, Stanford—1.179, 1.180, 1.181.

Zivnuska, John A.—3.3.

IV. SUBJECT INDEX

ACCESS ROADS

FOREST AREAS ....
- Big game hunters, hunting activities and forest access in North Carolina. 2.81.
- Collection and application of information on use of forest recreation facilities. 1.151.
- Small game hunters, hunting activities and forest access in North Carolina. 2.82.

LAKES AND STREAMS ....
- Access and reservoir site investigations. 1.108.
- Development of water recreation in lakes and rivers of the Bristol Bay region of Alaska. 1.4.
- Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.2.
- Public access survey of public waters in Central Texas. 1.161, 1.164, 1.170.
- Public access survey of public waters in Northeastern Texas. 1.160.
- Public access survey of public waters in Southern Texas. 1.172.
- State-wide lake and stream survey of Mississippi. 1.91.
- The effect of quality factors on the demand for water-based recreation. 2.44.

URBAN RECREATION..
- University outdoor recreation research study service special problems. 1.49.

WATER RESOURCES....
- Inventory of waters for fishing in northern Montana. 1.96.
- Public access survey of public waters in Central Texas. 1.162, 1.167.
- Public access survey of public waters in Eastern Texas. 1.174.
- Public lake access and facilities survey. 1.171, 1.209.

ADVERTISING ....
- Consumer decisions affecting vacation patterns. 2.91.
- National travel trends quarterly index. 2.86.
- Outdoor recreation motifs in magazine advertisements. 3.16.

AESTHETIC EFFECT

FOREST LANDSCAPE..
- Measurement of the aesthetic appeal of managed forest & wildland roadside environments. 2.16.
- Some effects of landscape enhancement on timber production. 1.55.
- The use of eye pupillary response in forest aesthetic studies. 4.13.

RECREATION SITES ....
- Turfgrass development, production and management for utility, beauty and recreational facilities. 1.21.

ROADSIDE ....
- A study of some effects of junkyard screening and billboard density. 1.140.
- Economic, legal and aesthetic qualities of an urban route selection in Oklahoma. 1.132.
- Identification and estimation of economic benefits from scenic enhancement of New Jersey highways. 1.145.
- Incorporating scenic considerations into highway investment decisions. 1.75.
- Multiple use of lands within highway rights-of-way. 1.13, 1.14.
- The man-land relationship when driving for pleasure in Waterloo County. 2.93.
- Woody and herbaceous plants for roadside ground cover. 1.60.

URBAN BEAUTIFICATION ....
- Arizona outdoor recreation planning project. 1.11.

WATER SITES ....
- Competitive recreational uses of selected Iowa lakes. 2.27.
- The effect of quality factors on the demand for water-based recreation. 2.44.

ALABAMA ....
- A biological inventory of certain streams and impoundments in Alabama. 1.1.
- Marketing of outdoor recreational service. 3.1.
- Study of the Alabama deer hunter. 2.1.
- Tourists and Alabama business, an economic analysis. 3.41.
- Waterfowl harvest and hunting pressure. 2.2.

ALASKA ....
- Development of water recreation in lakes and rivers of the Bristol Bay region of Alaska. 1.4.
- Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.2, 1.3.
- Snow vehicle—caribou study—harvest. 2.3.

ALGAE ....
- Identification, ecology and significance of algae in environmental sanitation. 1.189.

AMERICAN SAMOA ....
- Federal grants-in-aid program, Land and Water Conservation Fund, Pacific Southwest region. 3.35.

ANGLER COUNTS ....
Creel census and angler counts on the Connecticut River. 1.69.
Fishing pressure estimate and economic survey on trout waters in the Black Hills of South Dakota. 2.80.
Rock Creek creel census—summer census. 2.42.
St. Johns River fishery project. 1.45.

ARIZONA ....
A model option for instruction in wildland recreation management at the college undergraduate level. 1.129.
Arizona outdoor recreation planning project. 1.11.
Cooperative land and water resources inventory. 1.10.
Cooperative water resources inventory of Arizona. 1.5.
Evaluation of trout stocking program in the Lake Mohave area. 1.7.
Federal grants-in-aid program, Land and Water Conservation Fund, Pacific Southwest region. 3.35.
Forest recreation demand analysis. 2.5.
Hunting and fishing pressure in Central Arizona. 1.8.
Possible effects of Alamo Dam construction on fish and wildlife resources in Arizona. 1.9.
Survey of hunter and fisherman expenditures. 2.4.
Trends in urbanization, industrialization, and recreational use of arid lands. 1.12.
Water storage project—Central Arizona project. 1.6.

ARKANSAS ....
Rural resource use and potentials for economic development in low-income areas of Arkansas. 3.58.
Travel in Arkansas. An economic analysis. 3.42.

BOATING ....
A fishery survey of the Connecticut River. 1.35.
A spatial analysis of recreational boating in selected areas of Ohio. 2.67.
Annual angler harvest from selected lakes. 1.130.
Competitive recreational uses of selected Iowa lakes. 2.27.
Criteria for evaluating the quality of water-based recreation facilities. 2.61.
Enhancement of recreational uses of estuarine waters through control of sea nettles. 1.67.
Eutrophication in water resources of New York State. 1.39.
Hawaii State comprehensive outdoor recreation plan. 1.56.
Hydrology of river-based recreation. 1.190.
Michigan outdoor recreation demand study. 4.6.
Outdoor recreation planning by a systems analysis approach. 4.7.
Public access survey of public waters in Central Texas. 1.161, 1.162.
Public access survey of public waters in Eastern Texas. 1.174.
Public access survey of public waters in Southern Texas. 1.172.
Recreational values of water in the major reservoirs of New Mexico. 1.115.
Resource adjustments to provide income from private outdoor recreation enterprises. 3.32.
Selection of a method for estimating the demand for non-market water resources. 4.27.
Sport fishery catch statistics for tautog. 2.58.
The effect of quality factors on the demand for water-based recreation. 2.44.

CALIFORNIA ....
Analysis and evaluation of sport fishing activities in Southern California. 1.16.
Determination of ecological factors important to management of mountain meadows. 1.193.
Economic analysis of multiple uses of wilderness areas. 3.2.
Economics of fire protection on wild lands in California. 3.3.
Federal grants-in-aid program, Land and Water Conservation Fund, Pacific Southwest region. 3.35.
Guides for forest land management under accelerated recreation demands and intensive land use. 3.4.
Horticultural methods for planting, managing and enhancing vegetation on forest recreation sites. 1.19.
Licensed pheasant club management program. 1.17.
Recreation design criteria and demand. 4.23.
Recreation potential in a second-growth redwood stand—north coast of California. 1.58.
The impact of water export on the area of origin. 1.18.
The pre-hospital leisure-time activities of mental patients. 4.10.

CAMPING ....
- Analysis of factors influencing campers stay in Waterloo recreation area of Michigan. 2.34.
- Analysis of the operation and management of youth camps in Vermont. 3.67.
- Biology and control of insects in outdoor recreational areas. 2.21.
- Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.77.
- Cooperative forest recreation project with New York State College of Forestry. 2.63.
- Cooperative forest recreation research unit at Raleigh, North Carolina. 1.143.
- Ecology and management of Boundary Waters Canoe Area campsites. 1.90.
- Environmental factors in campground rehabilitation and protection. 1.29.
- Factors contributing to more efficient recreation planning for Michigan state forest campgrounds. 1.81.
- Factors influencing campground and campsite selection. 2.36.
- Forest recreation demand analysis. 2.5.
- Guides for forest land management under accelerated recreation demands and intensive land use. 3.4.
- Hawaii state comprehensive outdoor recreation plan. 1.56.
- Horticultural methods for planting, managing and enhancing vegetation on forest recreation sites. 1.19.
- Hydrology of river-based recreation. 1.190.
- Information center—recreation for the handicapped. 4.21.
- Michigan outdoor recreation demand study. 4.6.
- Planning, improving, protecting and managing forest recreation. 1.127.
- Recreational values of water in the major reservoirs of New Mexico. 1.115.
- Resource adjustments to provide income from private outdoor recreation enterprises. 3.32.
- Social and ecological problems of northwoods wilderness-type recreation. 1.124.
- The economics of outdoor recreation as a use of rural lands. 3.56.

CANADA ....
- Leisure time attitudes and activities of industrial workers. 2.72.
- Ontario Provincial Parks travel study using a carbon tracer questionnaire. 4.18.
- The man-land relationship when driving for pleasure in Waterloo County. 2.93.
- The spatial distribution and locational analysis of ski resorts in Southern Ontario. 3.68.
- Water supply and demand for New York and the adjoining Northeast region. 1.37.

CLIMATE
- ARID AREAS .... Trends in urbanization, industrialization, and recreational use of arid lands. 1.12.
- CAVES .... Cave climate of Carlsbad Caverns National Park in New Mexico. 1.192.
- FOREST AREAS .... Estimating recreational visits and use on unattended sites. 4.2.
  - Weather and climate of scaled quail study areas. 1.112.
- LAKE AREAS .... An environmental approach for identifying outdoor recreation planning regions. 1.154.
  - Creel census on five lakes in Wisconsin. 2.97.
- RECREATION AREAS.. University outdoor recreation research study series—environmental recreation resources. 1.51.
- SKI AREAS .... Factors influencing use intensity of ski areas in Vermont. 1.204.

COLORADO ....
- Environmental factors in campground rehabilitation and protection. 1.29.
- Impact of land use on water quality within a forested mountain watershed. 1.30.
- Impact of the Costilla Project on migratory birds and hunting in the San Luis Valley. 1.25.
- Impact of the Pueblo Reservoir on migratory birds and hunting opportunities in the Arkansas Valley. 1.27.
- Impact of Upper South Platte Project on migratory birds and hunting in South Platte Valley. 1.26.
- Inventory and biology of Yellowstone lake and stream fishes. 1.32.
- Inventory of forest recreation resources in selected Colorado counties. 1.31.
- Parvin Lake quality fishing studies. 2.6.
- Recreational facilities inventory, demand and plan for Colorado. 1.82, 1.83.
- Survey of potential public waterfowl shooting areas in Colorado. 1.23.

The economics and administration of water resources. 3.5.
Water resources development studies—Costilla Project, Eastdale Reservoir. 1.24.
Water resources development studies—Grand Mesa Project in Colorado. 1.28.

COMPETITION .... Development of water recreation in lakes and rivers of the Bristol Bay Region of Alaska. 1.4.
Planning to prevent conflict in rural land uses. 4.1.
Recreation design criteria and demand. 4.23.
Recreation potential in a second-growth redwood stand—north coast of California. 1.58.
Recreational facilities in northern Wisconsin. 1.207.

COMPUTER USE
FISHING
Creel Census .... Catalog of inland fishing waters. 1.122.
Creel census on five lakes in Wisconsin. 2.97.
Dynamics of the fish population in Tenkiller Ferry Reservoir. 1.131.
Fishing pressure estimate and economic survey on trout waters in the Black Hills of South Dakota. 2.80.
Rock Creek creel census—summer census. 2.42.
Harvest .... Annual angler harvest from selected lakes. 1.130.
Creel census on five lakes in Wisconsin. 2.97.
The harvest of salmon and steelhead as determined from salmon and steelhead permits. 2.23.
PLANNING PROCESS.. Comprehensive outdoor recreation plan, State of Missouri. 1.84.
Hawaii state comprehensive outdoor recreation plan. 1.56.
Optimizing combinations of outdoor recreation and other alternative enterprises. 3.31.
Outdoor recreation planning by a systems analysis approach. 4.7.
Planning data for the Georgia State Comprehensive Outdoor Recreation Project. 1.48.
Recreation facilities planning, file design and tabulation. 4.11.
Water supply and demand for New York and the adjoining Northeast region. 1.37.

USER CHARACTERISTICS.. A survey of fishermen participation and preferences. 2.24.
Analysis of the characteristics and distribution of the Ohio fisherman population. 2.66.
Analysis of waterfowl kill card data. 1.194.
Big game hunting pressure survey. 2.60.
Comprehensive outdoor recreation plan, State of Missouri. 1.84.
Upland game investigations—Fort Cobb Crow Study. 2.70.
WATER RESOURCES.... Creel census, fishing pressure and management of Lake Seminole and Lake Blackshear in Georgia. 1.47.
Simulation as a means of studying resource allocations. 1.133.
State-wide lake and stream inventory of Minnesota. 1.85.
Use of Oklahoma Department of Wildlife Conservation lakes for fishing and recreation. 2.68, 2.69.

CONNECTICUT .... A fishery survey of the Connecticut River. 1.35.
Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.8.
Development of recreational space standards for any given population. 1.36.

CONSERVATION .... Ecology and management of Boundary Waters Canoe Area campsites. 1.90.
Inventory, evaluation, and conservation of islands in the U.S., Puerto Rico and Virgin Islands. 1.180.
University outdoor recreation research study service—special problems. 1.49.

COSTS
BENEFIT-COST
Forest Recreation .... Planning, improving, protecting and managing forest recreation. 1.127.
Public Land Use .... Ownership and mangement arrangements for control and use of resources in the Western States. 2.7.
Recreation Development .... Cost harvest ratio from Southeastern New Mexico winter trout waters. 2.52.
Developing agricultural land in recreational uses under private ownership. 3.50.
Economic analysis of multiple uses of wilderness areas. 3.2.
Optimal planning of recreational development for Charlestown, R. I. 3.33.
FOREST RECREATION .... Recreational opportunities and resources on small woodlands. 1.128.

LAND RESOURCES	Recreation land acquisition policies and programs in Midwestern metropolitan areas. 1.156.
OPERATIONAL	
Mobile Recreation	International survey of mobile recreation facilities. 1.103.
Parks—Public	1965 recreation and park yearbook. 1.104.
Sightseeing	Study of the possibilities and problems in creating living, historical farms. 2.79.
	The socio-economics of recreational use of the Cache Elk Herd. 3.63.
Youth Camps	Analysis of the operation and management of youth camps in Vermont. 3.64.
RECREATION DEVELOPMENT	Economic study of land and water oriented recreation facilities in Maryland. 3.12.
	Economics of agricultural land and water use, conservation and development in watersheds of Okla. 3.28.
	International survey of mobile recreation facilities. 1.103.
	Private outdoor recreation operations and public policy in Massachusetts. 3.13.
	Recreation design criteria and demand. 4.23.
	The economics of outdoor recreation as a use of rural lands. 3.56.
WATER RESOURCES....	Economic problems in the use, allocation, regulation, and pricing of water. 3.17.
	Industrial water and waste disposal requirements in New Jersey. 1.147.
	Water resources study of Brandywine Creek Basin in Pennsylvania. 1.15.
	Water supply and demand for New York and the adjoining Northeast region. 1.137.
CREDIT	An analysis of the Federal credit programs related to commercial outdoor recreation. 3.53.
	Survey of need for Federal credit for financing private outdoor recreation. 3.54.
CREEL CENSUS	Analysis and evaluation of sport fishing activities in Southern California. 1.16.
	Conservation officer creel census on lakes and streams. 2.51.
	Cooperative water resources inventory of Arizona. 1.5.
	Creel census and angler counts on the Connecticut River. 1.69.
	Creel census and economic survey of Dale Hollow Tailwater in Tennessee. 2.84.
	Creel census and usage studies on Ute, Lake Van, and Chicosa Lake. 2.55.
	Creel census and usage study of Conchas Lake. 2.54.
	Creel census on five lakes in Wisconsin. 2.97.
	Creel census, benthos sampling and economic impact of Lake D'Arbonne in Louisiana. 1.63.
	Creel census, fishing pressure and management of Lake Seminole and Lake Blackshear in Georgia. 1.47.
	Dynamics of the fish population in Tenkiller Ferry Reservoir. 1.131.
	Effects of fly-fishing only on a brook trout population. 2.99.
	Effects of restrictive size and bag limits on a wild brook trout population. 2.98.
	Evaluation of river fish populations. 1.94.
	Evaluation of trout stocking program in the Lake Mohave area. 1.7.
	Fishing pressure estimate and economic survey on trout waters in the Black Hills of South Dakota. 2.80.
	Inventory of waters for fishing in Eastern Montana. 1.99.
	Owyhee district fisheries management investigations (Northeast Nevada). 1.109.
	Rock Creek creel census—summer census. 2.42.
	Sport fishery creel census of Currituck Sound in North Carolina. 2.62.
	The reliability of partial creel checks as estimators of season totals. 4.14.
	Use of Oklahoma Department of Wildlife Conservation lakes for fishing and recreation. 2.69.
	Water quality, fish population and vegetation control of State Park lakes in Texas. 1.168.
	Water storage project—central Arizona project. 1.6.
	Wheeler District fisheries management investigations. 1.107.
DAMAGE-LAND	
FIRE	Economics of fire protection on wild lands in California. 3.3.
NATIONAL CATASTROPHE	Implications of wilderness values in the National Park System. 1.80.
USE	
Campground	Changes in campground vegetation and soils in relation to fertilizer, water and visitor use. 1.199.

Environmental factors in campground rehabilitation and protection. 1.29.
Impact of recreationists on campsites in Utah. 1.198.
Western wilderness recreation. 1.201.

Forest Areas .... Carrying capacity of different forest sites for recreational uses in Missouri. 2.40.
Determination of ecological factors important to management of mountain meadows. 1.193.
Human impact on vegetation in Glacier National Park. 2.12.
Magnitude & effects of site deterioration & trail erosion induced by recreationists. 2.83.
The effects of human impact on Sequoia Gigantea. 2.78.
Vegetative response to nine patterns of simulated recreational use. 4.26.

Lake Areas .... Baseline studies on recreational area. Yellowtail Reservoir. 2.43.

DELAWARE .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.11.
The demand for outdoor recreation facilities in Philadelphia, Baltimore, and Washington, D. C. 2.10.

DEMAND ANALYSIS
FORECASTING .... Conservation officer creel census on lakes and streams. 2.51.
Forest recreation demand analysis. 2.5.
Planning data for the Georgia State Comprehensive Outdoor Recreation Project. 1.48.
Recreation design criteria and demand. 4.23.
University outdoor recreation research study series—present demand trends. 2.20.

FOREST RECREATION .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.76.
Current status and possible future uses of forested spaces of the Eastern megalopolis. 1.138.
Factors contributing to more efficient recreation planning for Michigan State Forest campgrounds. 1.81.
Forest recreation demand analysis. 2.5.
Forest-recreation investment opportunities in Iowa. 3.9.

Inventory of forest recreation resources in selected Colorado counties. 1.31.
Western wilderness recreation. 1.201.

TOURISTS .... A study of tourism development in the Coastal Plains Area. 1.52.
Demand for recreation in the Wildhorse Creek Watershed. 2.71.
Tourism development in the Chattahoochee-Flint area of Georgia. 1.54.
Tourism development in the Georgia mountains area. 1.53.

URBAN RECREATION.. Development of recreational space standards for any given population. 1.36.
Recreation development in North Dakota. 3.24.
University outdoor recreation research study service—special problems. 1.49.

WATER RECREATION .... A National recreation area—the Connecticut River Study. 1.183.
Demand for recreation in the Wildhorse Creek Watershed. 4.17.
Michigan outdoor recreation demand study. 4.6.
Missouri River National Recreation Area Study. 1.182.
Recreational values of water in the major reservoirs of New Mexico. 1.115, 2.56.
Rock Creek creel census—summer census. 2.42.
The effect of quality factors on the demand for water-based recreation. 2.44.
Water resources study of Brandywine Creek Basin in Pennsylvania. 1.15.
Water supply and demand for New York and the adjoining Northeast region. 1.37.

WILDERNESS RECREATION .... Wildland recreational management. 3.30.

DEMAND-PROJECTED
BOATING .... Hydrology of river-based recreation. 1.190.
Selection of a method for estimating the demand for non-market water resources. 4.27.

CAMPING .... Analysis of the operation and management of youth camps in Vermont. 3.64.
Cooperative forest recreation project with New York State College of Forestry. 2.63.
Cooperative forest recreation research unit at Raleigh, North Carolina. 1.143.
Hydrology of river-based recreation. 1.190.

FARM RECREATION.... Demand of the metropolitan population in Missouri for rural recreation facilities. 2.41.
Resource adjustments to provide income from private outdoor recreation enterprises. 3.32.

FISHING .... Cooperative land and water resources inventory. 1.10.
Hunting and fishing pressure in Central Arizona. 1.8.
Hydrology of river-based recreation. 1.190.
Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.2.
Inventory of waters for fishing in Western Montana. 1.100.
Recreation value of water in a mutually exclusive setting. 1.195.
Selection of a method for estimating the demand for non-market water resources. 4.27.

FOREST RECREATION .... A recreational study of the upper St. John River Watershed. 1.65.
Degraded hardwood forests. 1.138.
Inventory of forest recreation resources in selected Colorado counties. 1.31.
Public and private forest recreation management guides, Eastern United States. 1.127.
Recreational opportunities and resources on small woodlands. 1.128.
Social and ecological problems of northwoods wilderness-type recreation. 1.124.
The effect of State forests and parks on public recreational use of private forests in Louisiana. 3.11.

HUNTING .... Cooperative land and water resources inventory. 1.10.
Hunting and fishing pressure in Central Arizona. 1.8.

LAND RESOURCES .... Comprehensive outdoor recreation plan, State of Missouri. 1.84.
Recreation design criteria and demand. 4.23.
University outdoor recreation research study series—environmental recreation resources. 1.51.

PICNICKING .... Cooperative forest recreation research unit at Raleigh, North Carolina. 1.143.

PRIVATE RECREATION .... Recreational facilities inventory, demand and plan for Colorado. 1.83.
University outdoor recreation research study series—analysis of the role of the private sector. 1.50.

RECREATION FACILITIES .... Demand for recreation in the Wildhorse Creek Watershed. 2.71, 4.17.
Demand of the metropolitan population in Missouri for rural recreation facilities. 2.41.
Economic study of land and water oriented recreation facilities in Maryland. 3.12.
Hawaii State comprehensive outdoor recreation plan. 1.56.
North Carolina outdoor recreation planning system. 1.142.
Private outdoor recreation operations and public policy in Massachusetts. 3.13.
Recreational facilities inventory, demand and plan for Colorado. 1.82.
Study of outdoor recreation demand based on analyses of National Recreation Survey 1960–1965. 1.146.
The demand for outdoor recreation facilities in Philadelphia, Baltimore, and Washington, D.C. 2.10.
The demand for outdoor recreation in Tennessee. 2.85.
University research study series—demand factors for outdoor recreation activities. 2.17, 2.18.

RURAL RECREATION.. Demand of the metropolitan population in Missouri for rural recreation facilities. 2.41.
The demand structure for rural recreation. 2.75.

WATER RECREATION .... A biological inventory of certain streams and impoundments in Alabama. 1.1.
A National recreation area—the Connecticut River Study. 1.183.
An investigation of factors affecting the intensity of use of water recreation facilities. 2.28.
Comprehensive outdoor recreation plan, State of Missouri. 1.84.
Demand for water based recreational activities in Nevada. 3.20.
Economic and legal factors in providing, using and managing water resources in agriculture. 3.70.
Impact of water based recreation. 1.40.

Irrigation & related water resources development of the East Dakota conservancy sub-district. 1.149.
Missouri River National Recreation Area Study. 1.182.
Outdoor recreation planning by a systems analysis approach. 4.7.
Recreation design criteria and demand. 4.23.
Selection of a method for estimating the demand for non-market water resources. 4.27.
State-wide lake and stream inventory of Minnesota. 1.85.
The impact of water export on the area of origin. 1.18.
University outdoor recreation research study series—environmental recreation resources. 1.51.
Water resources study of Brandywine Creek Basin in Pennsylvania. 1.15.
Water supply and demand for New York and the adjoining Northeast region. 1.37.

WILDERNESS RECREATION .... Economic analysis of multiple uses of wilderness areas. 3.2.

DEVELOPMENT GUIDES

CAVES .... Cave climate of Carlsbad Caverns National Park in New Mexico. 1.192.

COMMUNITY RECREATION .... Plans for expansion & use of community recreation resources for the handicapped. 1.34.

FARM RECREATION.... Economic appraisal of impacts of urban growth on rural land use. 3.55.

FOREST RECREATION .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.8.
Cooperative forest recreation research unit at Raleigh, North Carolina. 1.143.
Cooperative forest recreation research—North Carolina State University. 4.20.

RURAL RECREATION.. Analysis of feasibility of easements and protective covenants for guiding rural land use. 1.187.
Developing agricultural land in recreational uses under private ownership. 3.50.
Economic and social values in alternate use of rural lands in Pennsylvania. 2.74.
Marketing of outdoor recreational service. 3.1.
Study of the possibilities and problems in creating living, historical farms. 2.79.

WATER RECREATION .... Access and reservoir site investigations. 1.108.
Creel census and angler counts on the Connecticut River. 1.69.
Effect of recreation use and development on water quality of Lake of Egypt in Illinois. 1.153.
General survey of Kansas State waters for fishing. 1.61.
Hydrology of river-based recreation. 1.190.

DIRECT OBSERVATIONS .... Biology and control of insects in outdoor recreational areas. 2.21.
Cooperative land and water resources inventory. 1.10.
General survey of Kansas State waters for fishing. 1.61.
Inventory of waters for fishing in Northern Montana. 1.96.
Inventory of waters for fishing in Western Montana. 1.100.
Magnitude & effects of site deterioration & trail erosion induced by recreationists. 2.83.

DISTRICT OF COLUMBIA .... An analysis of the Federal credit programs related to commercial outdoor recreation. 3.53.
Appraisal of alternative means of economic development of specific local rural areas. 3.60.
Coordination of Federal outdoor recreation programs. 1.184.
Determination of procedures for coordinated regional recreation planning. 1.185.
Economic appraisal of impacts of urban growth on rural land use. 3.55.
Economic appraisal of local soil, water and other resource organizations. 3.57.
Federal agency outdoor recreation planning. 1.177.
Inventory and evaluate wild or scenic river needs and possibilities. 1.179.
Inventory, evaluation, and conservation of islands in the U.S., Puerto Rico and Virgin Islands. 1.180.
Missouri River National recreation area study. 1.182.
National land use inventory. 1.188.
National Rifle Association range project. 1.106.
Outdoor recreation related Federal programs—an inventory and digest. 1.178.

Recreation facilities planning, file design and tabulation. 4.11.
Study of fiscal 1967 Federal outdoor recreation budget. 3.52.
Study of private outdoor recreation enterprises. 1.176.
Study of the possibilities and problems in creating living, historical farms. 2.79.
Survey of need for Federal credit for financing private outdoor recreation. 3.54.
The demand for outdoor recreation facilities in Philadelphia, Baltimore, and Washington, D. C. 2.10.
The 1965 National Recreation Survey. 2.87.
The trails study. 1.181.

ECOLOGY .... A study of the ecology of sand dunes in relation to their stabilization. 1.123.
An inventory and study of beaver impounded water in Mississippi. 1.92.
Baseline studies on recreational area. Yellowtail Reservoir. 2.43.
Biology and control of insects in outdoor recreational areas. 2.21.
Determination of ecological factors important to management of mountain meadows. 1.193.
Determination of safe levels of pollution in Puerto Rico. 1.139.
Ecology of sport fish and sport fishery management in Illinois. 1.59.
Enhancement of recreational uses of estuarine waters through control of sea nettles. 1.67.
Fertilization and culture of Hawaii tree crops. 1.57.
General survey of Kansas State waters for fishing. 1.61.
Identification, ecology and significance of algae in environmental sanitation. 1.189.
Some ecological implications of the management of Itasca State Park to meet recreational objectives. 1.88.
Wildland recreation and social interaction. 1.136.

ECONOMIC IMPACT
ADVERTISING .... Study of the impact of outdoor advertising in Missouri. 3.18.
CAMPING .... Guides for forest land management under accelerated recreation demands and intensive land use. 3.4.
COMMUNITIES .... An economic analysis of alternative methods for marketing agricultural production rights. 3.26.
Economic feasibility and impact of vertical—short take-off-landing for Appalachian region. 3.69.
Planning, improving, protecting and managing forest recreation. 1.127.
FARM RECREATION.... Demand of the metropolitan population in Missouri for rural recreation facilities. 2.41.
Developing agricultural land in recreational uses under private ownership. 3.50.
Economic appraisal of opportunities for outdoor recreation on farms in Southeastern Ohio. 3.51.
Economic importance of recreation facilities and related services to Kentucky farmers. 3.10.
FISHING .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31.
Cooperative water resources inventory of Arizona. 1.5.
Creel census and economic survey of Dale Hollow Tailwater in Tennessee. 2.84.
Mail questionnaire survey to evaluate hunting and fishing demands. 2.46.
Recreational facilities inventory, demand and plan for Colorado. 1.82.
Survey of hunter and fisherman expenditures. 2.4.
FOREST RECREATION .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.96.
Forest-recreation investment opportunities in Iowa. 3.9.
Social and ecological problems of northwoods wilderness-type recreation. 1.124.
The effect of State forests and parks on public recreational use of private forests in Louisiana. 3.11.
GOVERNMENT AID .... The spatial distribution and locational analysis of ski resorts in Southern Ontario. 3.68.
HUNTING .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31.
Cooperative water resources inventory of Arizona. 1.5.
Mail questionnaire survey to evaluate hunting and fishing demands. 2.46.

Recreational facilities inventory, demand and plan for Colorado. 1.82.
Survey of hunter and fisherman expenditures. 2.4.
The socio-economics of recreational use of the Cache Elk Herd. 3.63.
Upland game investigations—Fort Cobb Crow Study. 2.70.

LAND RESOURCES ...... A method of assigning a market value to unique recreation. 3.14.
Cooperative forest recreation project with New York State College of Forestry. 2.63.
Economics of agricultural land and water use, conservation and development in watersheds of Okla. 3.28.
Planning to prevent conflict in rural land uses. 4.1.

PRIVATE ENTERPRISES .... Economic study of land and water oriented recreation facilities in Maryland. 3.12.
The spatial distribution and locational analysis of ski resorts in Southern Ontario. 3.68.

RANGE RECREATION.. Range and ranch management decisions on Western livestock ranches. 3.22.

RECREATIONAL DEVELOPMENT .... Economic impact of a major recreational development in a rural Ohio county. 3.27.
Economics of agricultural land and water use, conservation and development in watersheds of Okla. 3.28.
Factors affecting resource use and income potential in the Ozarks of Missouri. 3.19.
Optimal planning of recreational development for Charlestown, R. I. 3.33.
Recreation development in North Dakota. 3.24.
Recreational facilities in Northern Wisconsin. 1.207.
The economics of outdoor recreation enterprises. 3.6.

RECREATIONAL USE.. Carrying capacity of different forest sites for recreational uses in Missouri. 2.40.
The socio-economics of recreational use of the Cache Elk Herd. 3.61.

RURAL RECREATION.. Appraisal of alternative means of economic development of specific local rural areas. 3.60.
Marketing of outdoor recreational service. 3.1.
Opportunities for adjustments of farms and farm families in low-income farming areas in Mississippi. 3.59.
Rural resource use and potentials for economic development in low-income areas of Arkansas. 3.58.
The economics of outdoor recreation as a use of rural lands. 3.56.

SKI RESORTS .... The social and economic effects of a ski industry upon selected Vermont communities. 3.65.

TOURING .... A study of tourism development in the Coastal Plains Area. 1.52.
Identification and estimation of economic benefits from scenic enhancement of New Jersey highways. 1.145.
Illinois tourism study, an economic analysis. 3.43.
Knoxville annual tourist survey. 3.38.
North Carolina travel survey, an economic analysis. 3.47.
The Kansas City tourist trade, an economic analysis. 3.40.
The South Carolina travel trade, an economic analysis. 3.48.
The Tennessee tourist trade, an economic analysis. 3.49.
The travel business in Kentucky, an economic analysis. 3.45.
The travel business in Louisville, Kentucky. 3.39.
Tourism development in the Chattahoochee-Flint area of Georgia. 1.54.
Tourism development in the Georgia mountains area. 1.53.
Tourists and Alabama business, an economic analysis. 3.41.
Travel in Arkansas, an economic analysis. 3.42.
Travel in Iowa, an economic analysis. 3.44.
Travel in Mississippi, an economic analysis. 3.46.

URBANIZATION .... Economic appraisal of impacts of urban growth on rural land use. 3.55.

WATER POLLUTION CONTROL .... Alternative economic responses to the acid mine drainage problem in Southeastern Ohio. 3.25.

WATER RECREATION .... Demand for water based recreational activities in Nevada. 3.20.
Economic impact of marine-oriented activities in the Southern New England marine region. 3.34.
Impact of water based recreation. 1.40.
Southern Illinois regional economic data system of water resources. 1.152.

WATER RESOURCES DEVELOPMENT .... Creel census, benthos sampling and economic impact of Lake D'Arbonne in Louisiana. 1.63.
Economic and legal factors in providing, using and managing water resources in agriculture. 3.70.
Economic potentials for water resources development in South Dakota. 3.36.
Economic problems in the use, allocation, regulation, and pricing of water. 3.17.
Economics of agricultural land and water use, conservation and development in watersheds of Okla. 3.28.
Eutrophication in water resources of New York State. 1.39.
Fishing pressure estimate and economic survey on trout waters in the Black Hills of South Dakota. 2.80.
Irrigation & related water resources development of the East Dakota conservancy sub-district. 1.149.
Possible effects of Alamo Dam construction on fish and wildlife resources in Arizona. 1.9.
Regional comprehensive multi-purpose water resources planning studies. 1.117.
Social and psychological factors associated with proposed changes in water use patterns. 2.90.
The economics and administration of water resources. 3.5.
Williamette Basin development study. 3.29.

WILDERNESS RECREATION .... Economic analysis of multiple uses of wilderness areas. 3.2.
Wildland recreational management. 3.30.

YOUTH CAMPS .... Analysis of the operation and management of youth camps in Vermont. 3.64, 3.67.

EDUCATION

RECREATION ADMINISTRATION .. A study of undergraduate & graduate curriculums in recreation & park administraion. 1.89.
Plans for expansion & use of community recreation resources for the handicapped. 1.34.
Production of a training film for recreation leaders working with the mentally retarded. 1.72.

RECREATION RESEARCH .... Cooperative forest recreation research—North Carolina State University. 4.20.
Cooperative forest recreation research—Utah State University. 1.202.
Development of conceptual framework for Allegheny Plateau Studies. 4.12.

EMPLOYMENT

CLASSIFICATION .... University research study series—demand factors for outdoor recreation activities. 2.18.

PARKS-PUBLIC .... A study of undergraduate & graduate curriculums in recreation & park administration. 1.89.
1965 recreation and park yearbook. 1.104.

RURAL DEVELOPMENT .... Rural resource use and potentials for economic development in low-income areas of Arkansas. 3.58.

WATER RECREATION .... Economic impact of marine-oriented activities in the Southern New England marine region. 3.34.

ENGINEERING STUDIES.. Alternative economic responses to the acid mine drainage problem in Southeastern Ohio. 3.25.

FACILITIES

INVENTORY

Campsites .... Factors contributing to more efficient recreation planning for Michigan State forest campgrounds. 1.81.

Farm Recreation .... Economic importance of recreation facilities and related services to Kentucky farmers. 3.10.

Private Enterprises ...... Development of comprehensive inventory systems for recreation planning in Utah. 1.200.
Income-producing outdoor recreation on private lands. 3.66.
Private outdoor recreation operations and public policy in Massachusetts. 3.13.
Recreational facilities in Northern Wisconsin. 1.207.
Recreational facilities inventory, demand and plan for Colorado. 1.83.
University outdoor recreation research study series—analysis of the role of the private sector. 1.50.

Public .... Development of comprehensive inventory systems for recreation planning in Utah. 1.200.
Forest recreation in Louisiana. 1.62.

Private outdoor recreation operations and public policy in Massachusetts. 3.13.
Public access survey of public waters in Eastern Texas. 1.174.
Recreation facilities planning, file design and tabulation. 4.11.
Recreational facilities inventory, demand and plan for Colorado. 1.83.

Regional Recreation .... North Carolina outdoor recreation planning system. 1.142.
Recreation development in North Dakota. 3.24.
Study of outdoor recreation demand based on analyses of National Recreation Survey 1960–1965. 1.146.

Rural Recreation .... Marketing of outdoor recreational service. 3.1.

Ski Areas .... Factors influencing use intensity of ski areas in Vermont. 1.204.

Water Recreation .... Criteria for evaluating the quality of water based recreation facilities. 2.61.
Inventory and atlas of Gulf Coast sport fishing facilities. 1.186.
Literature and data compilation for Maryland reservoirs. 1.66.
Organizational arrangements in urban river basins to provide recreation and pollution control. 1.78.
Public access survey of public waters in Central Texas. 1.167, 1.170.
Public access survey of public waters in Eastern Texas. 1.174.
Public access survey of public waters in Southern Texas. 1.172.
Public lake access and facilities survey. 1.171, 1.209.
Sport fishery catch statistics for scup. 2.59.
State-wide lake and stream inventory of Minnesota. 1.85.
State-wide lake and stream survey of Mississippi. 1.91.

Wilderness Areas .... Recreational use of wilderness type areas. 1.136.

FARM RECREATION ...... Construction and management of small ponds and impoundments for waterfowl on farmland. 1.141.
Demand of the metropolitan population in Missouri for rural recreation facilities. 2.41.
Developing agricultural land in recreational uses under private ownership. 3.50.
Economic appraisal of impacts of urban growth on rural land use. 3.55.
Economic appraisal of opportunities for outdoor recreation on farms in Southeastern Ohio. 3.51.
Economic importance of recreation facilities and related services to Kentucky farmers. 3.10.
Economic study of land and water oriented recreation facilities in Maryland. 3.12.
Government aid to private recreation development in Georgia. 3.8.
Opportunities for adjustments of farms and farm families in low-income farming areas in Mississippi. 3.59.
Resource adjustments to provide income from private outdoor recreation enterprises. 3.32.
The economics of outdoor recreation as a use of rural lands. 3.56.
The utilization of rural land in Tompkins County, New York. 1.42.

FIRE PREVENTION .... A recreational study of the upper St. John River Watershed. 1.65.
Economics of fire protection on wild lands in California. 3.3.
Forest fire prevention through public interest in game. 1.205.
Wildland recreation and social interaction. 1.136.

FISH HARVEST .... Analysis and evaluation of sport fishing activities in Southern California. 1.16.
Evaluation of trout stocking program in the Lake Mohave area. 1.7.
Inventory and biology of Yellowstone lake and stream fishes. 1.32.
St. Johns River fishery project. 1.45.
The harvest of salmon and steelhead as determined from salmon and steelhead permits. 2.23.

FISH STOCKING .... Conservation officer creel census on lakes and streams. 2.51.
Creel census, fishing pressure and management of Lake Seminole and Lake Blackshear in Georgia. 1.47.
Evaluation of trout stocking program in the Lake Mohave area. 1.7.
Fishing pressure estimate and economic survey on trout waters in the Black Hills of South Dakota. 2.80.

Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.2, 1.3.
Inventory of waters for fishing in Northern Montana. 1.96.

FISHING

ECONOMIC IMPACT .... Resource adjustments to provide income from private outdoor recreation enterprises. 3.32.
Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9.
Cooperative water resources inventory of Arizona. 1.5.
Creel census and economic survey of Dale Hollow Tailwater in Tennessee. 2.84.
Hawaii state comprehensive outdoor recreation plan. 1.56.
Mail questionnaire survey to evaluate hunting and fishing demands. 2.46.
Recreational facilities inventory, demand and plan for Colorado. 1.82.
Survey of hunter and fisherman expenditures. 2.4.
The economics of outdoor recreation as a use of rural lands. 3.56.

FACILITIES .... Inventory and atlas of gulf coast sport fishing facilities. 1.186.
Michigan outdoor recreation demand study. 4.6.

FISH RESOURCES ...... A biological inventory of certain streams and impoundments in Alabama. 1.1.
Analysis and evaluation of sport fishing activities in Southern California. 1.16.
Annual angler harvest from selected lakes. 1.130.
Collection and application of information on use of forest recreation facilities. 1.151.
Creel census and angler counts on the Connecticut River. 1.69.
Creel census and usage studies in Ute, Lake Van, and Chicosa Lake. 2.55.
Creel census on five lakes in Wisconsin. 2.97.
Creel census, fishing pressure and management of Lake Seminole and Lake Blackshear in Georgia. 1.47.
Dynamics of the fish population in Tenkiller Ferry Reservoir. 1.131.
Ecology of sport fish and sport fishery management in Illinois. 1.59.
Effects of fly-fishing only on a brook trout population. 2.99.
Effects of restrictive size and bag limits on a wild brook trout population. 2.98.
Environmental changes, waterfowl usage, hunter pressure and feasibility of salt marsh impoundments. 1.121.
Evaluation of river fish populations. 1.94.
Evaluation of sport fishery for American shad in the Cape Fear River Basin. 1.120.
Evaluation of the effects of highway construction on the fish habitat of Little Prickly Pear Creek. 1.97.
Evaluation of trout stocking program in the Lake Mohave area. 1.7.
Fishery dynamics, Florida Bay. 1.73.
Owyhee district fisheries management investigations (Northeast Nevada). 1.109.
Sport fishery catch statistics for scup. 2.59.
Sport fishery catch statistics for tautog. 2.58.
Sport fishery creel census of Currituck Sound in North Carolina. 2.62.
St. Johns River fishery project. 1.45.
The harvest of salmon and steelhead as determined from salmon and steelhead permits. 2.23.
The reliability of partial creel checks as estimators of season totals. 4.14.
Wheeler District fisheries management investigations. 1.107.
1965 salt-water angling survey. 4.19.
1967 fish harvest inventory. 2.89.

FISHERMAN .... A survey of fishermen participation and preferences. 2.24.
Analysis of the characteristics and distribution of the Ohio fisherman population. 2.66.
Biology and control of insects in outdoor recreational areas. 2.21.
Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.76.
Cost harvest ratio from Southeastern New Mexico winter trout waters. 2.52.
Leased public hunting area utilization by permit holders. 2.64.
Survey of effort and success by Oregon anglers. 2.73.

WATER RESOURCES.... A fishery survey of the Connecticut River. 1.35.

A National recreation area—the Connecticut River Study. 1.183.
Access and reservoir site investigations. 1.108.
Competitive recreational uses of selected Iowa lakes. 2.27.
Cooperative forest recreation research unit at Raleigh, North Carolina. 1.143.
Cooperative land and water resources inventory. 1.10.
Creel census, benthos sampling and economic impact of Lake D'Arbonne in Louisiana. 1.63.
Criteria for evaluating the quality of water based recreation facilities. 2.61.
Development of water recreation in lakes and rivers of the Bristol Bay region of Alaska. 1.4.
Eutrophication in water resources of New York State. 1.39.
Evaluation of the effects of highway construction on the fish habitat of Little Prickly Pear Creek. 1.95.
General survey of Kansas State waters for fishing. 1.61.
Hydrology of river-based recreation. 1.190.
Industrial water and waste disposal requirements in New Jersey. 1.147.
Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.2.
Inventory of waters for fishing in Eastern Montana. 1.99.
Inventory of waters for fishing in Northern Montana. 1.96.
Inventory of waters for fishing in Western Montana. 1.100.
Investigation of fish killing pollution by sportsmen and game wardens in Texas. 1.173.
Literature and data compilation for Maryland reservoirs. 1.66.
Parvin Lake quality fishing studies. 2.6.
Pollution studies of waters in North-central Txeas. 1.163.
Possible effects of Alamo Dam construction of fish and wildlife resources in Arizona. 1.9.
Public access survey of public waters in Central Texas. 1.161, 1.162, 1.164.
Public access survey of public waters in Eastern Texas. 1.174.
Public access survey of public waters in Northeastern Texas. 1.160.
Public access survey of public waters in Southern Texas. 1.172.
Recreation value of water in a mutually exclusive setting. 1.195.
Recreational values of water in the major reservoirs of New Mexico. 1.115.
Selection of a method for estimating the demand for non-market water resources. 4.27.
Survey of potential public waterfowl shooting areas in Colorado. 1.23.
Survey of Texas State park waters. 1.175.
The effect of quality factors on the demand for water-based recreation. 2.44.
Use of Oklahoma Department of Wildlife Conservation lakes for fishing and recreation. 2.68, 2.69.
Water quality, fish population and vegetation control of State park lakes in Texas. 1.168.

FLIES .... Biology and control of flies annoying to man and animals. 1.43.

FLORIDA .... County of residence of hunters checked on the management areas. 2.14.
Fishery dynamics, Florida Bay. 1.73.
Inventory and atlas of Gulf Coast sport fishing facilities. 1.186.
Liaison with mosquito control agencies. 1.44.
Measurement of the aesthetic appeal of managed forest & wildland roadside environments. 2.16.
Production of a training film for recreation leaders working with the mentally retarded. 1.72.
Recreation site usage in the Florida Everglades wildlife management area. 2.15.
Sportsman's opinion survey. 2.13.
St. Johns River fishery project. 1.45.

FOREST RECREATION .... A recreational study of the upper St. John River Watershed. 1.65.
Carrying capacity of different forest sites for recreational uses in Missouri. 2.40.
Consumer analysis for specific forest-oriented recreational activities in the northeast. 2.8, 2.9, 2.11, 2.31, 2.47, 2.76, 2.96.

Cooperative forest recreation research—North Carolina State University. 4.20.
Cooperative forest recreation research—Utah State University. 1.202.
Current status and possible future uses of forested spaces of the Eastern megalopolis. 1.138.
Forest recreation in Louisiana. 1.62.
Forest recreational use of private-owned land in Garrett Co., Maryland. 1.68.
Forest-recreation investment opportunities in Iowa. 3.9.
Recreational opportunities and resources on small woodlands. 1.128.
The effect of State forests and parks on public recreational use of private forests in Louisiana. 3.11.
The effects of human impact on Sequoia Gigantea. 2.78.

GEORGIA .... A study of tourism development in the Coastal Plains area. 1.52.
Biology and control of insects in outdoor recreational areas. 2.21.
Creel census, fishing pressure and management of Lake Seminole and Lake Blackshear in Georgia. 1.47.
Government aid to private recreation development in Georgia. 3.8.
Performance traits of forest recreationists, a behavioral study. 2.22.
Planning data for the Georgia State Comprehensive Outdoor Recreation Project. 1.48.
Tourism development in the Chattahoochee-Flint area of Georgia. 1.54.
Tourism development in the Georgia mountains area. 1.53.
University outdoor recreation research study series—present demand trends. 2.20.
University outdoor recreation research study series—analysis of the role of the private sector. 1.50.
University outdoor recreation research study series—environmental recreation resources. 1.51.
University outdoor recreation research study series—government studies. 3.7.
University outdoor recreation research study service—special problems. 1.49.
University research study series—demand factors for outdoor recreation activities. 2.17, 2.18.
University research study series—recreation travel and mobility. 2.19.

GOVERNMENT PROGRAMS

ADMINISTRATION ...... Administration of outdoor recreation in New York State Government. 1.118.
Outdoor recreation related Federal programs—an inventory and digest. 1.178.
Study of fiscal 1967 Federal outdoor recreation budget. 3.52.
University outdoor recreation research study series—government studies. 3.7.
University outdoor recreation research study service—special problems. 1.49.

FEDERAL AID .... An analysis of the Federal credit programs related to commercial outdoor recreation. 3.53.
Development of water recreation in lakes and rivers of the Bristol Bay region of Alaska. 1.4.
Federal grants-in-aid program, Land and Water Conservation Fund, Pacific southwest region. 3.35.
Hawaii State comprehensive outdoor recreation plan. 1.56.
Stimulate forest recreation research by financial aid and coordination of effort. 4.15.
Study of fiscal 1967 Federal outdoor recreation budget. 3.52.
Survey of need for Federal credit for financing private outdoor recreation. 3.54.

PLANNING .... A review and analysis of classification schemes for public outdoor recreation areas. 4.4.
Coordination of Federal outdoor recreation programs. 1.184.
Determination of procedures for coordinated regional recreation planning. 1.185.
Federal agency outdoor recreation planning. 1.177.
Recreational facilities inventory, demand and plan for Colorado. 1.83.
State comprehensive outdoor recreation plan, North Dakota. 1.125.
Study of fiscal 1967 Federal outdoor recreation budget. 3.52.
Western wilderness recreation. 1.201.

PRIVATE RECREATION .... Government aid to private recreation development in Georgia. 3.8.

RECREATIONAL
- DEVELOPMENT .... An economic analysis of alternative methods for marketing agricultural production rights. 3.26.
  - Annual utilization of Colliers Mills-Success Lake restoration area by hunters. 2.49.
  - Economic appraisal of local soil, water and other resource organizations. 3.57.
  - Study of fiscal 1967 Federal outdoor recreation budget. 3.52.
  - Study of the possibilities and problems in creating living, historical farms. 2.79.
- SCENIC RIVERS .... Inventory and evaluate wild or scenic river needs and possibilities. 1.179.
- SCENIC TRAILS .... The trails study. 1.181.
- STATE AID .... Administration of outdoor recreation in New York State Government. 1.118.
  - Development of water recreation in lakes and rivers of the Bristol Bay region of Alaska. 1.4.
  - Hawaii State comprehensive outdoor recreation plan. 1.56.
  - University outdoor recreation research study series—government studies. 3.7.

GUAM .... Federal grants-in-aid program, Land and Water Conservation Fund, Pacific Southwest region. 3.35.

HAWAII .... Federal grants-in-aid program, Land and Water Conservation Fund, Pacific Southwest region. 3.35.
- Fertilization and culture of Hawaii tree crops. 1.57.
- Hawaii State comprehensive outdoor recreation plan. 1.56.

HIGHWAYS
- DEVELOPMENT .... Economic, legal and aesthetic qualities of an urban route selection in Oklahoma. 1.132.
  - Establishment and maintenance of vegetation on highway rights-of-way. 1.159.
  - Evaluation of the effects of highway construction on the fish habitat of Little Prickly Pear Creek. 1.95, 1.97.
  - Methods of establishing and caring for plants used for roadside shoulders and channels. 1.114.
  - Multiple uses of lands within highway rights-of-way. 1.13, 1.14.
  - Woody and herbaceous plants for roadside ground cover. 1.60.
- SCENIC .... A study of some effects of junkyard screening and billboard density. 1.140.
  - Archeological and historical inventory of sites in New Mexico. 1.113.
  - Arizona outdoor recreation planning project. 1.11.
  - Guides for forest land management under accelerated recreation demands and intensive land use. 3.4.
  - Identification and estimation of economic benefits from scenic enhancement of New Jersey highways. 1.145.
  - Incorporating scenic considerations into highway investment decisions. 1.75.

HIKING .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.8.
- Hawaii State comprehensive outdoor recreation plan. 1.56.
- Information center—recreation for the handicapped. 4.21.

HISTORY .... A case study in providing local recreation land in a subdivision. 1.77.
- Archeological and historical inventory of sites in New Mexico. 1.113.
- General survey of Kansas State waters for fishing. 1.61.
- Interpretation of the Ancient Bristlecone Pine Forest and the White Mountains of California. 1.76.
- University outdoor recreation research study series—environmental recreation resources. 1.51.

HUNTING
- ECONOMIC IMPACT .... Cooperative water resources inventory of Arizona. 1.5.
  - Hawaii State comprehensive outdoor recreation plan. 1.56.
  - Recreational facilities inventory, demand and plan for Colorado. 1.82.
  - Resource adjustments to provide income from private outdoor recreation enterprises. 3.32.
  - The economics of outdoor recreation as a use of rural lands. 3.56.
  - The socio-economics of recreational use of the Cache Elk Herd. 3.61, 3.63
- FACILITIES .... Competitive recreational uses of selected Iowa lakes. 2.27.
  - Licensed pheasant club management program. 1.17.
  - Michigan outdoor recreation demand study. 4.6.

GAME RESOURCES .... A study of hunting and duck populations on a selected area in West-central Minnesota. 1.86.
Analysis of waterfowl kill card data. 1.194.
Antelope population trend estimates and harvest information. 1.110.
Big game hunting pressure survey. 2.60.
Determination of big game harvest. 1.208.
Determination of deer hunting pressure in Massachusetts. 2.29.
Environmental changes, waterfowl usage, hunter pressure and feasibility of salt marsh impoundments. 1.121.
Hunter survey and bag check. 2.45.
Impact of the Costilla Project on migratory birds and hunting in the San Luis Valley. 1.25.
Impact of the Pueblo Reservoir on migratory birds and hunting opportunities in the Arkansas Valley. 1.27.
Impact of Upper South Platte project on migratory birds and hunting in South Platte Valley. 1.26.
Prairie chicken hunting harvest field surveys. 1.111.
Snow vehicle—caribou study—harvest. 2.3.
Studies of teal populations in New Mexico. 2.53.
Study of methods and procedures in game harvest surveys. 4.8.
Study of the feeding patterns of and hunting pressure on waterfowl attracted to a sanctuary. 1.87.
Surplus game availability in areas of Texas. 1.165. 1.166.
Surplus game harvest, Black Gap wildlife management area. 1.169.
Telephone survey of game harvest and hunting pressure. 4.16.
Upland game investigations—Fort Cobb Crow study. 2.70.
Water resources development studies—Costilla Project, Eastdale Reservoir. 1.24.
Water resources development studies—Grand Mesa project in Colorado. 1.28.
Waterfowl harvest and hunting pressure. 2.2.
Waterfowl production, utilization, and harvest on salt marsh areas. 2.50.
Weather and climate of scaled quail study areas. 1.112.

HUNTER .... Annual utilization of Colliers Mills-Success Lake restoration area by hunters. 2.49.
Big game hunters, hunting activities and forest access in North Carolina. 2.81.
Check of hunter accuracy in response to questionnaires. 4.3.
Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.76.
County of residence of hunters checked on the management areas. 2.14.
Game bird hunter questionnaire. 2.101.
Game kill questionnaire. 2.26.
Hunter attitude surveys. 2.32.
Mail questionnaire survey to evaluate hunting and fishing demands. 2.46.
Postcard survey of deer hunters. 2.48.
Public hunting area utilization survey. 2.65.
Small game hunters, hunting activities and forest access in North Carolina. 2.82.
Spy-blind study to learn accuracy of hunters mail surveys. 4.9.
Study of the Alabama deer hunter. 2.1.
Survey of hunter and fisherman expenditures. 2.4.
Utilization of wildlife management areas. 2.30.

LAND RESOURCES .... Availability of private land for public hunting in Angelina County, Texas. 1.155.
Collection and application of information on use of forest recreation facilities. 1.151.
Cooperative forest recreation research unit at Raleigh, North Carolina. 1.143.
Cooperative land and water resources inventory. 1.10.
Forest fire prevention through public interest in game. 1.205.
Leased public hunting area utilization by permit holders. 2.64.
Survey of potential public waterfowl shooting areas in Colorado. 1.23.

IDAHO .... A survey of fishermen participation and preferences. 2.24.
Estimating recreational visits and use on unattended sites. 4.2.
The harvest of salmon and steelhead as determined from salmon and steelhead permits. 2.23.

ILLINOIS ....
- An environmental approach for identifying outdoor recreation planning regions. 1.154.
- Ecology of sport fish and sport fishery management in Illinois. 1.59.
- Effect of recreation use and development on water quality of Lake of Egypt in Illinois. 1.153.
- Illinois tourism study, an economic analysis. 3.43.
- Information center—recreation for the handicapped. 4.21.
- Multiple uses of lands within highway rights-of-way. 1.13, 1.14.
- Provisions in leasing contracts and rental rates paid for rural lands in Illinois. 3.37.
- Recreation in a correctional institution. 2.25.
- Recreation land acquisition policies and programs in Midwestern metropolitan areas. 1.156.
- Southern Illinois regional economic data system of water resources. 1.152.
- Special services—recreation for the handicapped. 4.22.
- Woody and herbaceous plants for roadside ground cover. 1.60.

INDIANA ....
- A study of some effects of junkyard screening and billboard density. 1.140.
- Optimizing combinations of outdoor recreation and other alternative enterprises. 3.31.
- Resource adjustments to provide income from private outdoor recreation enterprises. 3.32.

INSURANCE ....
- International survey of mobile recreation facilities. 1.103.
- Liability insurance programs of rural recreation enterprises in Southern Michigan. 3.15.

IOWA ....
- Competitive recreational uses of selected Iowa lakes. 2.27.
- Forest-recreation investment opportunities in Iowa. 3.9.
- Recreation land acquisition policies and programs in Midwestern metropolitan areas. 1.156.
- Travel in Iowa, an economic analysis. 3.44.

KANSAS ....
- General survey of Kansas State waters for fishing. 1.61.
- The Kansas city tourist trade, an economic analysis. 3.40.

KENTUCKY ....
- Economic importance of recreation facilities and related services to Kentucky farmers. 3.10.
- The travel business in Kentucky, an economic analysis. 3.45.
- The travel business in Louisville, Kentucky. 3.39.

LAND MANAGEMENT

ALTERNATIVE USE ....
- A recreational study of the upper St. John River Watershed. 1.65.
- Basic land economic data for selected areas of Northern Wisconsin. 3.71.
- Cooperative forest recreation project with New York State College of Forestry. 2.63.
- Developing agricultural land in recreational uses under private ownership. 3.50.
- Ecology and management of Boundary Waters Canoe Area campsites. 1.90.
- Economic analysis of multiple uses of wilderness areas. 3.2.
- Economic and social values in alternate use of rural lands in Pennsylvania. 2.74.
- Economic appraisal of impacts of urban growth on rural land use. 3.55.
- Economics of agricultural land and water use, conservation and development in watersheds of Okla. 3.28.
- Optimizing combinations of outdoor recreation and other alternative enterprises. 3.31.
- Ownership and management arrangements for control and use of resources in the Western States. 2.7.
- Planning to prevent conflict in rural land uses. 4.1.
- Range and ranch management decisions on Western livestock ranches. 3.22.
- Recreational use of wilderness areas and requirements in relation to other forest uses. 1.136.
- Some effects of landscape enhancement on timber production. 1.55.

FOREST AREAS

Silviculture ....
- Opportunities for adjustments of farms and farm families in low-income farming areas in Mississippi. 3.59.
- Planning, improving, protecting and managing forest recreation. 1.127.
- Some effects of landscape enhancement on timber production. 1.55.
- The effects of human impact on Sequoia Gigantea. 2.78.

Vegetation .... Changes in campground vegetation and soils in relation to fertilizer, water and visitor use. 1.199.
Cooperative forest recreation project with New York State College of Forestry. 2.63.
Establishment of tree plantings to enhance recreation potential of selected sites. 1.148.
Feasibility of predicting durability of recreation sites under managed and unmanaged conditions. 1.196.
Guides for forest land management under accelerated recreation demands and intensive land use. 3.4.
Horticultural methods for planting, managing and enhancing vegetation on forest recreation sites. 1.19.
Social and ecological problems of northwoods wilderness-type recreation. 1.124.
Some ecological implications of the management of Itasca State Park to meet recreational objectives. 1.8.

MULTIPLE USE .... A model option for instruction in wildland recreation management at the college undergraduate level. 1.129.
An economic analysis of alternative methods for marketing agricultural production rights. 3.26.
Economic analysis of multiple uses of wilderness areas. 3.2.
Economics of multiple use of forest land and methodology for its classification. 1.203.
Forest fire prevention through public interest in game. 1.205.
Impact of land use on water quality within a forested mountain watershed. 1.30.
Multiple uses of land within highway rights-of-way. 1.13, 1.14.
National land use inventory. 1.188.
Recreational potential in a second-growth redwood stand —north coast of California. 1.58.
Recreation use of industrial forest lands in upper counties of Michigan. 1.74.
Wildland recreational management. 3.30.

WILDERNESS AREAS.. A model option for instruction in wildland recreation management at the college undergraduate level. 1.129.

LAND OWNERSHIP

DONORS .... A method of assigning a market value to unique recreation. 3.14.

LAND OWNERS

Forest Areas .... Antelope population trend estimates and harvest information. 1.110.
Availability of private land for public hunting in Angelina County, Texas. 1.155.
Economics of multiple use of forest land and methodology for its classification. 1.203.
Forest recreation in Louisiana. 1.62.
Optimizing combinations of outdoor recreation and other alternative enterprises. 3.31.

Model .... Government aid to private recreation development in Georgia. 3.8.

Rural Lands .... An economic analysis of alternative methods for marketing agricultural production rights. 3.26.
Economic appraisal of impacts of urban growth on rural land use. 3.55.

Wetlands .... A study of hunting and duck populations on a selected area in West-central Minnesota. 1.86.

Wilderness Areas .... Wilderness area classification and problems of private use and land ownership. 1.116.
Wildland recreational management. 3.30.

LEASES

Rural Land .... Provisions in leasing contracts and rental rates paid for rural lands in Illinois. 3.37.

PATTERNS .... Determination of procedures for coordinated regional recreation planning. 1.185.
Inventory of forest recreation resources in selected Colorado counties. 1.31.
Ownership and management arrangements for control and use of resources in the Western States. 2.7.

URBAN AREAS .... Basic land economic data for selected areas of Northern Wisconsin. 3.71.

LAND RESOURCES

ACQUISITION .... A method of assigning a market value to unique recreation. 3.14.
Coordination of Federal outdoor recreation programs. 1.184.
Federal grants-in-aid program, Land and Water Conservation Fund, Pacific Southwest region. 3.35.
Recreation land acquisition policies and programs in Midwestern metropolitan areas. 1.156.
Survey of potential public waterfowl shooting areas in Colorado. 1.23.

The economics of outdoor recreation as a use of rural lands. 3.56.

CAMPGROUNDS .... Ecology and management of Boundary Waters Canoe Area campsites. 1.90.
Guides for forest land management under accelerated recreation demands and intensive land use. 3.4.

CARRYING CAPACITY .... Concepts, definitions, and standards involved in the recreational carrying capacity of land. 4.5.
Developing agricultural land in recreational uses under private ownership. 3.50.
Western wilderness recreation. 1.201.

FARM LANDS .... Economics of agricultural land and water use, conservation and development in watersheds of Okla. 3.28.
Hawaii State comprehensive outdoor recreation plan. 1.56.

FOREST AREAS .... Analysis of recreation potential in a second-growth redwood stand in North coast region of California. 1.58.
Hawaii State comprehensive outdoor recreation plan. 1.56.

HUNTING AREAS .... Availability of private land for public hunting in Angelina County, Texas. 1.155.
Hawaii State comprehensive outdoor recreation plan. 1.56.

INVENTORY
Forest Areas .... Collection and application of information on use of forest recreation facilities. 1.151.
Economics of multiple use of forest land and methodology for its classification. 1.203.
Forest recreation in Louisiana. 1.62.
Forest recreational use of private-owned land in Garrett Co., Maryland. 1.68.
Forest-recreation investment opportunities in Iowa. 3.9.
Inventory of forest recreation resources in selected Colorado counties. 1.31.
Recreation potential in a second-growth redwood stand—north coast of California. 1.58.
Western wilderness recreation. 1.201.
Islands .... Inventory, evaluation, and conservation of islands in the U.S., Puerto Rico and Virgin Islands. 1.180.
Lake Areas .... Recreation development in Bear Lake area. 3.62.
National .... A review and analysis of classification schemes for public outdoor recreation areas. 4.4.
National land use inventory. 1.188.
Rural .... Developing agricultural land in recreational uses under private ownership. 3.50.
The utilization of rural land in Tompkins County, New York. 1.42.
State wide .... Development of comprehensive inventory systems for recreational planning in Utah. 1.200.
Recreational land acquisition policies and programs in midwestern metropolitan areas. 1.156.
University outdoor recreation research study series—environmental recreation resources. 1.51.
Wetlands .... Appraise, classify and catalogue existing and potential wetlands. 1.64.
Wilderness Areas .... Wilderness area classification and problems of private use and land ownership. 1.116.

PUBLIC WETLANDS .... Construction and management of small ponds and impoundments for waterfowl on farmland. 1.141.
Survey of potential public waterfowl shooting areas in Colorado. 1.23.

RURAL AREAS .... Appraisal of alternative means of economic development of specific local rural areas. 3.60.
Economic and social values in alternate use of rural lands in Pennsylvania. 2.74.
The economics of outdoor recreation as a use of rural lands. 3.56.

WILDERNESS AREAS.. Trends in urbanization, industrialization, and recreational use of arid lands. 1.12.
Wilderness area classification and problems of private use and land ownership. 1.116.

LEGAL ASPECTS
EASEMENTS .... Access and reservoir site investigations. 1.108.
Analysis of feasibility of easements and protective covenants for guiding rural land use. 1.187.
Economic, legal and aesthetic qualities of an urban route selection in Oklahoma. 1.132.
General survey of Kansas State waters for fishing. 1.61.
Multiple uses of lands within highway rights-of-way. 1.13, 1.14.
Ownership and management arrangements for control and use of resources in the Western States. 2.7.

- LEASES
  - Access and reservoir site investigations. 1.108.
  - Provisions in leasing contracts and rental rates paid for rural lands in Illinois. 3.37.
- LEGISLATION
  - Government aid to private recreation development in Georgia. 3.8.
  - Inventory and evaluate wild or scenic river needs and possibilities. 1.179.
  - Outdoor recreation related Federal programs—an inventory and digest. 1.178.
  - Planning data for the Georgia State Comprehensive Outdoor Recreation Project. 1.48.
  - Survey of need for Federal credit for financing private outdoor recreation. 3.54.
  - University outdoor recreation research study series—government studies. 3.7.
  - Water and related land resources law and political institutions. 1.38.
- LICENSED PHEASANT CLUBS
  - Licensed pheasant club management program. 1.17.
- TRAFFIC REGULATIONS
  - International survey of mobile recreation facilities. 1.103.
- VIOLATIONS
  - Fishing
    - Investigation of fish killing pollution by sportsmen and game wardens in Texas. 1.173.
- WATER RIGHTS
  - Economic and legal factors in providing, using and managing water resources in agriculture. 3.70.
  - Economic problems in the use, allocation, regulation, and pricing of water. 3.17.
  - Owyhee district fisheries management investigations (Northeast Nevada). 1.109.
  - The economics and administration of water resources. 3.5.
  - Water and related land resources law and political institutions. 1.38.

- LEISURE
  - Comprehensive outdoor recreation plan, State of Missouri. 1.84.
  - Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.96.
  - Demand of the metropolitan population in Missouri for rural recreation facilities. 2.41.
  - Economic study of land and water oriented recreation facilities in Maryland. 3.12.
  - Flatland Johannesburg—a study of a densely populated urban area. 2.100.
  - Leisure time attitudes and activities of industrial workers. 2.37, 2.72.
  - The demand structure for rural recreation. 2.75.
  - The pre-hospital leisure-time activities of mental patients. 4.10.

- LICENSE REVIEW
  - A survey of fishermen participation and preferences. 2.24.
  - Big game hunting pressure survey. 2.60.
  - County of residence of hunters checked on the management areas. 2.14.
  - Creel census on five lakes in Wisconsin. 2.97.
  - Determination of big game harvest. 1.208.
  - Licensed pheasant club management program. 1.17.
  - The harvest of salmon and steelhead as determined from salmon and steelhead permits. 2.23.

- LOUISIANA
  - Creel census, benthos sampling and economic impact of Lake D'Arbonne in Louisiana. 1.63.
  - Forest recreation in Louisiana. 1.62.
  - The effect of State forests and parks on public recreational use of private forests in Louisiana. 3.11.

- MAINE
  - A recreational study of the upper St. John River Watershed. 1.65.
  - Appraise, classify and catalogue existing potential wetlands. 1.64.
  - Game kill questionnaire. 2.26.

- MAPS
  - A fishery survey of the Connecticut River. 1.35.
  - Antelope population trend estimates and harvest information. 1.110.
  - Appraise, classify and catalogue existing and potential wetlands. 1.64.
  - Forest fire prevention through public interest in game. 1.205.
  - General survey of Kansas State waters for fishing. 1.61.
  - Inventory and Atlas of Gulf Coast sport fishing facilities. 1.186.
  - Inventory of forest recreation resources in selected Colorado counties. 1.31.
  - Inventory of waters for fishing in Western Montana. 1.100.
  - Recreation potential in a second-growth redwood stand —north coast of California. 1.58.

- State-wide lake and stream survey of Mississippi. 1.91.
- Use of Oklahoma Department of Wildlife Conservation lakes for fishing and recreation. 2.68.
- Wilderness area classification and problems of private use and land ownership. 1.116.

MARKETING RECREATION .... Marketing of outdoor recreational service. 3.1.

MARYLAND ....
- An investigation of factors affecting the intensity of use of water recreation facilities. 2.28.
- Construction and management of small ponds and impoundments for waterfowl on farmland. 1.141.
- Economic study of land and water oriented recreation facilities in Maryland. 3.12.
- Enhancement of recreational uses of estuarine waters through control of sea nettles. 1.67.
- Forest recreational use of private-owned land in Garrett Co., Maryland. 1.68.
- Literature and data compilation for Maryland reservoirs. 1.66.
- National Rifle Association range project. 1.106.
- Spy-blind study to learn accuracy of hunters mail surveys. 4.9.
- The demand for outdoor recreational facilities in Philadelphia, Baltimore, and Washington, D. C. 2.10.

MASSACHUSETTS ....
- A survey and evaluation of small artificial recreational ponds in Central Massachusetts. 1.71.
- Check of hunter accuracy in response to questionnaires. 4.3.
- Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.31.
- Creel census and angler counts on the Connecticut River. 1.69.
- Determination of deer hunting pressure in Massachusetts. 2.29.
- Private outdoor recreation operations and public policy in Massachusetts. 3.13.
- Some effects of landscape enhancement on timber production. 1.55.
- Survey and evaluation of small artificial recreational ponds in Central Massachusetts. 1.70.
- Utilization of wildlife management areas. 2.30.

MATHEMATICAL ANALYSIS

STATISTICAL TECHNIQUES ....
- A test of printout traffic counters for estimating visitor use at recreation areas. 4.25.
- An investigation of factors affecting the intensity of use of water recreation facilities. 2.28.
- Annual angler harvest from selected lakes. 1.130.
- Appraisal of alternative means of economic development of specific local rural areas. 3.60.
- Big game hunting pressure survey. 2.60.
- Competitive recreational uses of selected Iowa lakes. 2.27.
- Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.77.
- Creel census, fishing pressure and management of Lake Seminole and Lake Blackshear in Georgia. 1.47.
- Economic and legal factors in providing, using and managing water resources in agriculture. 3.70.
- Estimating recreational visits and use on unattended sites. 4.2.
- Forest recreation in Louisiana. 1.62.
- Game bird hunter questionnaire. 2.101.
- Public hunting area utilization survey. 2.65.
- Recreation use by sample counts and continuous records. 4.24.
- Study of methods and procedures in game harvest surveys. 4.8.
- Telephone survey of game harvest and hunting pressure. 4.16.
- The effect of State forests and parks on public recreational use of private forests in Louisiana. 3.11.

MICHIGAN ....
- A case study in providing local recreation land in a subdivision. 1.77.
- A method of assigning a market value to unique recreation. 3.14.
- A review and analysis of classification schemes for public outdoor recreation areas. 4.4.

Analysis of factors influencing attendance at forest recreation sites. 2.39.
Analysis of factors influencing campers' stay in Waterloo recreation area of Michigan. 2.34.
Concepts, definitions, and standards involved in the recreational carrying capacity of land. 4.5.
Effect of membership in private recreation clubs and membership use of public recreation lands. 2.33.
Establishing and developing the self-guiding trail as an interpretive media in urban natural areas. 2.35.
Evaluation of public use of State game areas in Southern Michigan. 2.33.
Factors contributing to more efficient recreation planning for Michigan State forest campgrounds. 1.81.
Factors influencing campground and campsite selection. 2.36.
Feasibility of integrating social and physical land use factors in recreation planning process. 1.79.
Hunter attitude surveys. 2.32.
Hydrology of river-based recreation. 1.190.
Implications of wilderness values in the National Park System. 1.80.
Incorporating scenic considerations into highway investment decisions. 1.75.
Interpretation of the Ancient Bristlecone Pine Forest and the White Mountains of California. 1.76.
Leisure time attitudes and activities of industrial workers. 2.37.
Liability insurance programs of rural recreation enterprises in Southern Michigan. 3.15.
Michigan outdoor recreation demand study. 4.6.
Organizational arrangements in the Milwaukee River, Southeastern Wisconsin to provide recreation. 1.78.
Outdoor recreation motifs in magazine advertisements. 3.16.
Outdoor recreation planning by a systems analysis approach. 4.7.
Recreation use of industrial forest lands in upper counties of Michigan. 1.74.
Social and ecological problems of northwoods wilderness-type recreation. 1.124.
Stimulate forest recreation research by financial aid and coordination of effort. 4.15.
Study of methods and procedures in game harvest surveys. 4.8.

MINNESOTA .... A study of hunting and duck populations on a selected area in West-central Minnesota. 1.86.
A study of undergraduate & graduate curriculums in recreation & park administration. 1.89.
Ecology and management of Boundary Waters Canoe Area campsites. 1.90.
Economic problems in the use, allocation, regulation, and pricing of water. 3.17.
Hydrologic parameters controlling recreational use of Minnesota rivers. 1.191.
Recreation land acquisition policies and programs in Midwestern metropolitan areas. 1.156.
Social and ecological problems of northwoods wilderness-type recreation. 1.124.....
Some ecological implications of the management of Itasca State Park to meet recreational objectives. 1.88.
State-wide lake and stream inventory of Minnesota. 1.85.
Study of the feeding patterns of and hunting pressure on waterfowl attracted to a sanctuary. 1.87.

MISSISSIPPI .... An inventory and study of beaver impounded water in Mississippi. 1.92.
Establishment and management of Southern turf grass. 1.93.
Opportunities for adjustments of farms and farm families in low-income farming areas in Mississippi. 3.59.
State-wide lake and stream survey of Mississippi. 1.91.
Travel in Mississippi, an economic analysis. 3.46.

MISSOURI .... Carrying capacity of different forest sites for recreation uses in Missouri. 2.40.
Comprehensive outdoor recreation plan, State of Missouri. 1.84.
Demand of the metropolitan population in Missouri for rural recreation facilities. 2.41.
Factors affecting resource use and income potential in the Ozarks of Missouri. 3.19.

Recreation land acquisition policies and programs in Midwestern metropolitan areas. 1.156.
Recreational facilities inventory, demand and plan for Colorado. 1.82, 1.83.
Study of the impact of outdoor advertising in Missouri. 3.18.

MOBILE RECREATION .... International survey of mobile recreation facilities. 1.103.

MODEL
  ADVERTISING .... Study of the impact of outdoor advertising in Missouri. 3.18.
  DEMAND FORECASTING .... Forest recreation demand analysis. 2.5.
  LAND ALLOCATION .... Ownership and management arrangements for control and use of resources in the Western States. 2.7.
  LAND OWNERS .... Government aid to private recreation development in Georgia. 3.8.
    Optimizing combinations of outdoor recreation and other alternative enterprises. 3.31.
  PARTICIPATION .... Study of outdoor recreation demand based on analysis of National Recreation Survey 1960–1965. 1.146.
  PLANNING PROCESS.. Feasibility of integrating social and physical land use factors in recreation planning process. 1.79.
  RESOURCE ALLOCATION .... Simulation as a means of studying resource allocations. 1.33.
    Some effects of landscape enhancement on timber production. 1.55.
    The spatial distribution and locational analysis of ski resorts in Southern Ontario. 3.68.
  WATER RECREATION DEMAND .... Demand for recreation in the Wildhorse Creek Watershed. 4.17.
    Demand for water based recreational activities in Nevada. 3.20.
    Economic and legal factors in providing, using and managing water resources in agriculture. 3.70.
    Recreation value of water in a mutually exclusive setting. 1.95.
    Recreational values of water in the major reservoirs of New Mexico. 1.115.
    Selection of a method for estimating the demand for non-market water resources. 4.27.

MONTANA .... Baseline studies on recreational area. Yellowtail Reservoir. 2.43.
  Biological survey of wild rivers. 1.101.
  Evaluation of river fish populations. 1.94.
  Evaluation of the effects of highway construction on the fish habitat of Little Prickly Pear Creek. 1.95, 1.97.
  Inventory of waters for fishing in Eastern Montana. 1.99.
  Inventory of waters for fishing in Northern Montana. 1.96.
  Inventory of waters for fishing in Western Montana. 1.100.
  Missouri River National recreation area study. 1.182.
  Rock Creek creel census—summer census. 2.42.
  The economic value to hunters from small game. 3.21.
  Water inventory of Upper Swan, Salmon River and high alkaline Eureka Lakes of Montana. 1.98.
  Wild river evaluation and classification. 1.102.

NEBRASKA .... Analysis of feasibility of easements and protective covenants for guiding rural land use. 1.187.
  Recreation land acquisition policies and programs in Midwestern metropolitan areas. 1.156.

NEVADA .... Access and reservoir site investigations. 1.108.
  Demand for water based recreational activities in Nevada. 3.20.
  Federal grants-in-aid program, Land and Water Conservation Fund, Pacific Southwest region. 3.35.
  Owyhee district fisheries management investigations (Northeast Nevada). 1.109.
  The effect of quality factors on the demand for water-based recreation. 2.44.
  Wheeler District fisheries management investigations. 1.107.

NEW HAMPSHIRE .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.47.
  Hunter survey and bag check. 2.45.
  Mail questionnaire survey to evaluate hunting and fishing demands. 2.46.

NEW JERSEY .... Annual utilization of Colliers Mills-Succees Lake restoration area by hunters. 2.49.

Identification and estimation of economic benefits from scenic enhancement of New Jersey highways. 1.145.
Industrial water and waste disposal requirements in New Jersey. 1.147.
Postcard survey of deer hunters. 2.48.
Public Health Service short-term course for professional health personnel working with the retarded. 1.105.
Study of outdoor recreation demand based on analyses of National Recreation Survey 1960–1965. 1.146.
Waterfowl production, utilization, and harvest on salt marsh areas. 2.50.
1965 salt-water angling survey. 4.19.

NEW MEXICO .... Antelope population trend estimates and harvest information. 1.110.
Archeological and historical inventory of sites in New Mexico. 1.113.
Cave climate of Carlsbad Caverns National Park in New Mexico. 1.192.
Conservation officer creel census on lakes and streams. 2.51.
Cost harvest ratio from Southeastern New Mexico winter trout waters. 2.52.
Creel census and usage studies on Ute, Lake Van, and Chicosa Lake. 2.55.
Creel census and usage study of Conchas Lake. 2.54.
Methods of establishing and caring for plants used for roadside shoulders and channels. 1.114.
Prairie chicken hunting harvest field surveys. 1.111.
Range and ranch management decisions on Western livestock ranches. 3.22.
Recreational values of water in the major reservoirs of New Mexico. 1.115, 2.56.
Studies of teal populations in New Mexico. 2.53.
Weather and climate of scaled quail study areas. 1.112.
Wilderness area classification and problems of private use and land ownership. 1.116.

NEW YORK .... Administration of outdoor recreation in New York State government. 1.118.
Availability & use of recreation resources for chronically disabled children in the United States. 1.33.
Big game hunting pressure survey. 2.60.
Biological survey of wild rivers. 1.101.
Consumer analysis for specified forest-oriented recreational activities in the Northeast. 2.9.
Cooperative forest recreation project with New York State College of Forestry. 2.63.
Development of conceptual framework for Allegheny Plateau studies. 4.12.
Eutrophication in water resources of New York State. 1.39.
Impact of water based recreation. 1.40.
International survey of mobile recreation facilities. 1.103.
Multiple purpose water resource investigations. 1.41.
National travel trends quarterly index. 2.86.
Planning to prevent conflict in rural land uses. 4.1.
Planning, improving, protecting and managing forest recreation. 1.127.
Plans for expansion & use of community recreation resources for the handicapped. 1.34.
Problem analysis in outdoor recreation. 1.119.
Recreational opportunities and resources on small woodlands. 1.128.
Regional comprehensive multi-purpose water resources planning studies. 1.117.
South Brooklyn youth leadership project. 2.57.
Sport fishery catch statistics for scup. 2.59.
Sport fishery catch statistics for tautog. 2.58.
The economics of outdoor recreation enterprises. 3.6.
The use of eye pupillary response in forest aesthetic studies. 4.13.
The utilization of rural land in Tompkins County, New York. 1.42.
Water and related land resources law and political institutions. 1.38.
Water supply and demand for New York and the adjoining Northeast region. 1.37.
Wild river evaluation and classification. 1.102.
1965 recreation and park yearbook. 1.104.

NOISE ABATEMENT .... National Rifle Association range project. 1.106.

NORTH CAROLINA .... A study of the ecology of sand dunes in relation to their stabilization. 1.123.

Big game hunters, hunting activities and forest access in North Carolina. 2.81.
Catalog of inland fishing waters. 1.122.
Collection and application of information on use of forest recreation facilities. 1.151.
Cooperative forest recreation research—North Carolina State University. 4.20.
Criteria for evaluating the quality of water based recreation facilities. 2.61.
Environmental changes, waterfowl usage, hunter pressure and feasibility of salt marsh impoundments. 1.121.
Evaluation of sport fishery for American shad in the Cape Fear River basin. 1.120.
Human impact on vegetation in Glacier National Park. 2.12.
North Carolina outdoor recreation planning system. 1.142.
North Carolina travel survey, an economic analysis. 3.47.
Small game hunters, hunting activities and forest access in North Carolina. 2.82.
Sport fishery creel census of Currituck Sound in North Carolina. 2.62.
The reliability of partial creel checks as estimators of season totals. 4.14.

NORTH DAKOTA .... Recreation development in North Dakota. 3.24.
State comprehensive outdoor recreation plan. 1.125.

OHIO .... A spatial analysis of recreational boating in selected areas of Ohio. 2.67.
Alternative economic responses to the acid mine drainage problem in Southeastern Ohio. 3.25.
An economic analysis of alternative methods for marketing agricultural production rights. 3.26.
Analysis of the characteristics and distribution of the Ohio fisherman population. 2.66.
Annual angler harvest from selected lakes. 1.130.
Economic appraisal of opportunities for outdoor recreation on farms in Southeastern Ohio. 3.51.
Economic impact of a major recreational development in environmental sanitation. 1.189.
Leased public hunting area utilization by permit holders. 2.64.
Public hunting area utilization survey. 2.65.
Telephone survey of game harvest and hunting pressure. 4.16.

OKLAHOMA .... Demand for recreation in the Wildhorse Creek watershed. 2.71, 4.17.
Dynamics of the fish population in Tenkiller Ferry Reservoir. 1.131.
Economic, legal and aesthetic qualities of an urban route selection in Oklahoma. 1.132.
Economics of agricultural land and water use, conservation and development in watersheds of Okla. 3.28.
Upland game investigations—Fort Cobb Crow study. 2.70.
Use of Oklahoma Department of Wildlife Conservation lakes for fishing and recreation. 2.68, 2.69.

OREGON .... Investigation of aquatic weed problems and means of control with emphasis on brazilian waterweed. 1.134.
Recreational use of wilderness areas and requirements in relation to other forest uses. 1.136.
Simulation as a means of studying resource allocations. 1.133.
Survey of effort and success by Oregon anglers. 2.73.
Willamette basin development study. 3.29.

PARKS—PUBLIC .... Implications of wilderness values in the National Park System. 1.80.
Ontario Provincial Parks travel study using a carbon tracer questionnaire. 4.18.
1965 recreation and park yearbook. 1.104.

PENNSYLVANIA .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.76.
Cooperative forest recreation project with New York State College of Forestry. 2.63.
Degraded hardwood forests. 1.138.
Economic and social values in alternate use of rural lands in Pennsylvania. 2.74.
Planning, improving, protecting and managing forest recreation. 1.127.
The demand for outdoor recreation facilities in Philadelphia, Baltimore, and Washington, D. C. 2.10.
The demand structure for rural recreation. 2.75.

- Water quality investigations to determine feasibility of recreational reservoir on Swatara Creek. 1.206.
- Water resources study of Brandywine Creek basin in Pennsylvania. 1.15.
- Wildland recreational management. 3.30.

PERSONAL INTERVIEWS

CAMPERS
- Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.47, 2.77.
- Recreational values of water in the major reservoirs of New Mexico. 1.115.

FISHERMEN
- Analysis of the characteristics and distribution of the Ohio fisherman population. 2.66.
- Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.31, 2.96.
- Consumer analysis of selected forest-oriented recreational activities. 2.92.
- Creel census and usage studies on Ute, Lake Van, and Chicosa Lake. 2.55.
- Fishing pressure estimate and economic survey on trout waters in the Black Hills of South Dakota. 2.80.
- General survey of Kansas State waters for fishing. 1.61.
- Recreational values of water in the major reservoirs of New Mexico. 1.115.
- Sport fishery catch statistics for scup. 2.59.
- Sport fishery catch statistics for tautog. 2.58.
- Survey of hunter and fisherman expenditures. 2.4.
- Water storage project—Central Arizona project. 1.6.

GOVERNMENT PERSONNEL
- Development of conceptual framework for Allegheny Plateau studies. 4.12.
- Economic appraisal of local soil, water and other resource organizations. 3.57.
- General survey of Kansas State waters for fishing. 1.61.
- Government aid to private recreation development in Georgia. 3.8.
- Problem analysis in outdoor recreation. 1.119.

HIKERS
- Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.8.

HUNTERS
- Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.31, 2.96.
- Consumer analysis of selected forest-oriented recreational activities. 2.92.
- Determination of deer hunting pressure in Massachusetts. 2.29.
- Evaluation of public use of State game areas in Southern Michigan. 2.33.
- Hunter attitude surveys. 2.32.
- Hunter survey and bag check. 2.45.
- Studies of teal populations in New Mexico. 2.53.
- Survey of hunter and fisherman expenditures. 2.4.
- Upland game investigations—Fort Cobb Crow study. 2.70.
- Water storage project—Central Arizona project. 1.6.

PRIVATE INVESTORS
- Availability of private land for public hunting in Angelina County, Texas. 1.155.
- Forest recreation in Louisiana. 1.62.
- Liability insurance programs of rural recreation enterprises in Southern Michigan. 3.15.
- Range and ranch management decisions on Western livestock ranches. 3.22.
- Study of private outdoor recreation enterprises. 1.176.
- The economics of outdoor recreation enterprises. 3.6.

RECREATIONISTS
- Biology and control of insects in outdoor recreational areas. 2.21.
- Economic appraisal of opportunities for outdoor recreation on farms in Southeastern Ohio. 3.51.
- Flatland Johannesburg—a study of a densely populated urban area. 2.100.
- Forest recreational use of private-owned land in Garrett Co., Maryland. 1.68.
- Forest-recreation investment opportunities in Iowa. 3.9.
- Recreational facilities inventory, demand and plan for Colorado. 1.82, 1.83.
- Regional comprehensive multi-purpose water resources planning studies. 1.117.
- Social and psychological factors associated with proposed changes in water use patterns. 2.90.
- The demand for outdoor recreation in Tennessee. 2.85.
- The economics of outdoor recreation as a use of rural lands. 3.56.
- The socio-economics of recreational use of the Cache Elk Herd. 3.61.
- The 1965 National Recreation Survey. 2.87.

University outdoor recreation research study series—present demand trends. 2.20.
Utilization of wildlife management areas. 2.30.

TOURISTS .... Consumer decisions affecting vacation patterns. 2.91.
National travel trends quarterly index. 2.86.
University research study series—recreation travel and mobility. 2.19.

PEST CONTROL .... Biology and control of flies annoying to man and animals. 1.43.
Biology and control of insects in outdoor recreational areas. 2.21.
Enhancement of recreational uses of estuarine waters through control of sea nettles. 1.67.
Environmental changes, waterfowl usage, hunter pressure and feasibility of salt marsh impoundments. 1.121.
Liaison with mosquito control agencies. 1.44.

PHEASANT CLUBS .... Licensed pheasant club management program. 1.17.

PHOTOGRAPHY
  AERIAL .... A survey and evaluation of small artificial recreational ponds in Central Massachusetts. 1.71.
  Appraise, classify and catalogue existing and potential wetlands. 1.64.
  Economic appraisal of impacts of urban growth on rural land use. 3.55.
  Inventory of waters for fishing in Northern Montana. 1.96.
  Inventory of waters for fishing in Western Montana. 1.100.
  State-wide lake and stream survey of Mississippi. 1.91.
  Water storage project—Central Arizona project. 1.6.
  MAPPING .... Inventory of waters for fishing in Western Montana. 1.100.
  State-wide lake and stream survey of Mississippi. 1.91.
  MOTION .... Development of recreational space standards for any given population. 1.36.
  Measurement of the aesthetic appeal of managed forest & wildland roadside environments. 2.16.
  Production of a training film for recreation leaders working with the mentally retarded. 1.72.
  The use of eye pupillary response in forest aesthetic studies. 4.13.
  STILL .... Cooperative forest recreation project with New York State College of Forestry. 2.63.

Public and private forest recreation management guides, Eastern United States. 1.127.

PICNICKING .... Biology and control of insects in outdoor recreational areas. 2.21.
Cooperative forest recreation research unit at Raleigh, North Carolina. 1.143.
Hawaii State comprehensive outdoor recreation plan. 1.56.
Recreational values of water in the major reservoirs of New Mexico. 1.115.
Resource adjustments to provide income from private outdoor recreation enterprises. 3.32.

PLANNING
  GOVERNMENT PROGRAMS
    Nationwide .... An analysis of the Federal credit programs related to commercial outdoor recreation. 3.53.
    Coordination of Federal outdoor recreation programs. 1.184.
    Federal agency outdoor recreation planning. 1.177.
    Inventory and evaluate wild or scenic river needs and possibilities. 1.179.
    Recreation facilities planning, file design and tabulation. 4.11.
    Study of fiscal 1967 Federal outdoor recreation budget. 3.52.
    Study of outdoor recreation demand based on analyses of National recreation survey 1960–1965. 1.146.
    Survey of need for Federal credit for financing private outdoor recreation. 3.54.
    The Trails study. 1.181.
    Regional .... Administration of outdoor recreation in New York State government. 1.118.
    Determination of procedures for coordinated regional recreation planning. 1.185.
    Federal grants-in-aid program, Land and Water Conservation Fund, Pacific Southwest region. 3.35.
    Recreational facilities inventory, demand and plan for Colorado. 1.83.
    State comprehensive outdoor recreation plan, North Dakota. 1.125.
  ISLAND RECREATION .... Inventory, evaluation, and conservation of islands in the U.S., Puerto Rico and Virgin Islands. 1.180.

LAND ALLOCATION .... Arizona outdoor recreation planning project. 1.11.
  Development of conceptual framework for Allegheny Plateau studies. 4.12.
  Feasibility of integrating social and physical land use factors in recreation planning process. 1.79.
  Optimizing combinations of outdoor recreation and other alternative enterprises. 3.31.
  Planning to prevent conflict in rural land uses. 4.1.
METHODOLOGY .... University research study series—demand factors for outdoor recreation activities. 2.18.
  Western wilderness recreation. 1.201.
MODEL .... Feasibility of integrating social and physical land use factors in recreation planning process. 1.79.
  Outdoor recreation planning by a systems analysis approach. 4.7.
POTENTIAL RESOURCES .... Development of comprehensive inventory systems for recreation planning in Utah. 1.200.
  Economic feasibility and impact of vertical-short take-off-landing for Appalachian region. 3.69.
REQUIREMENTS PROJECTED
  Hunting And Fishing.... Analysis of waterfowl kill card data. 1.194.
    Hunting and fishing pressure in Central Arizona. 1.8.
    Mail questionnaire survey to evaluate hunting and fishing demands. 2.46.
    Water storage project—Central Arizona project. 1.6.
  Private Enterprises ...... Arizona outdoor recreation planning project. 1.11.
    Licensed pheasant club management program. 1.17.
    The effect of State forests and parks on public recreational use of private forests in Louisiana. 3.11.
  Resources .... Comprehensive outdoor recreation plan, State of Missouri. 1.84.
RECREATION DEVELOPMENT
  Forest Areas .... A recreational study of the upper St. John River Watershed. 1.65.
    Current status and possible future uses of forested spaces of the Eastern megalopolis. 1.138.
    Guides for forest land management under accelerated recreation demands and intensive land use. 3.4.
    Opportunities for adjustments of farms and farm families in low-income farming areas in Mississippi. 3.59.
    Recreation potential in a second-growth redwood stand—north coast of California. 1.58.
  Hunting .... Impact of upper South Platte project on migratory birds and hunting in South Platte Valley. 1.26.
  Lake Areas .... Recreation development in Bear Lake area. 3.62.
    Survey of Texas State park waters. 1.175.
    Water quality and primary production of South Dakota lakes. 1.150.
  Regional Recreation .... Development of conceptual framework for Allegheny Plateau studies. 4.12.
    Economics of multiple use of forest land and methodology for its classification. 1.203.
    North Carolina outdoor recreation planning system. 1.142.
    Optimal planning of recreational development for Charlestown, R. I. 3.33.
    Plans for expansion & use of community recreation resources for the handicapped. 1.34.
    Private outdoor recreation operations and public policy in Massachusetts. 3.13.
    Problem analysis in outdoor recreation. 1.119.
    Recreation development in North Dakota. 3.24.
    Recreational facilities inventory, demand and plan for Colorado. 1.82.
    Scorp university outdoor recreation research study series. 1.48.
    University outdoor recreation research study service—special problems. 1.49.
  Rural Areas .... The utilization of rural land in Tompkins County, New York. 1.42.
  Therapeutic Recreation .... Availability & use of recreation resources for chronically disabled children in the United States. 1.33.
  Tourism .... A study of tourism development in the Coastal Plains Area. 1.52.
    Tourism development in the Chattahoochee-Flint area of Georgia. 1.54.
    Tourism development in the Georgia mountains area. 1.53.
RESEARCH .... Stimulate forest recreation research by financial aid and coordination of effort. 4.15.

WATER RESOURCES....
- Hydrologic parameters controlling recreational use of Minnesota rivers. 1.191.
- Impact of water based recreation. 1.40.
- Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.3.
- Literature and data compilation for Maryland reservoirs. 1.66.
- Possible effects of Alamo Dam construction on fish and wildlife resources in Arizona. 1.9.
- Regional comprehensive multi-purpose water resources planning studies. 1.117.
- State-wide lake and stream inventory of Minnesota. 1.85.
- Water quality investigations to determine feasibility of recreational reservoir on Swatara Creek. 1.206.
- Water resources study of Brandywine Creek Basin in Pennsylvania. 1.15.
- Water supply and demand for New York and the adjoining Northeast region. 1.37.

POPULATION ANALYSIS..
- Flatland Johannesburg—a study of a densely populated urban area. 2.100.
- Forest-recreation investment opportunities in Iowa. 3.9.
- Planning data for the Georgia State Comprehensive Outdoor Recreation Project. 1.48.
- Rural resource use and potentials for economic development in low-income areas of Arkansas. 3.58.
- State comprehensive outdoor recreation plan, North Dakota. 1.125.
- The demand for outdoor recreation in Tennessee. 2.85.
- Trends in urbanization, industrialization, and recreational use of arid lands. 1.12.
- University research study series—demand factors for outdoor recreation activities. 2.17, 2.18.

PRIVATE ENTERPRISES

CLUBS ....
- Effect of membership in private recreation clubs and membership use of public recreation lands. 2.38.

ECONOMIC FEASIBILITY ....
- Income-producing outdoor recreation on private lands. 3.66.
- Recreation development in Bear Lake area. 3.62.
- Study of private outdoor recreation enterprises. 1.176.
- The economics of outdoor recreation enterprises. 3.6.
- University outdoor recreation research study series—analysis of the role of the private sector. 1.50.

FARM RECREATION....
- Economic appraisal of opportunities for outdoor recreation on farms in Southeastern Ohio. 3.51.
- National land use inventory. 1.188.
- The utilization of rural land in Tompkins County, New York. 1.42.

FOREST RECREATION ....
- Cooperative forest recreation research—North Carolina State University. 4.20.
- Forest recreational use of private-owned land in Garrett Co., Maryland. 1.68.
- Optimizing combinations of outdoor recreation and other alternative enterprises. 3.31.
- Recreation use of industrial forest lands in upper counties of Michigan. 1.74.
- Recreational opportunities and resources on small woodlands. 1.128.

GOVERNMENT AID ....
- An analysis of the Federal credit programs related to commercial outdoor recreation. 3.53.
- Government aid to private recreation development in Georgia. 3.8.
- Survey of need for Federal credit for financing private outdoor recreation. 3.54.

PUBLICATIONS ....
- Analysis and evaluation of sport fishing activities in Southern California. 1.16.
- Catalog of inland fishing waters. 1.122.
- Comprehensive outdoor recreation plan, State of Missouri. 1.84.
- Economic appraisal of local soil, water and other resource organizations. 3.57.
- Economic importance of recreation facilities and related services to Kentucky farmers. 3.10.
- Establishing and developing the self-guiding trail as an interpretive media in urban natural areas. 2.35.
- Forest recreation in Louisiana. 1.62.
- International survey of mobile recreation facilities. 1.103.
- Inventory and atlas of Gulf Coast sport fishing facilities. 1.186.
- National travel trends quarterly index. 2.86.

Ontario Provincial Parks travel study using a carbon tracer questionnaire. 4.18.
Outdoor recreation planning by a systems analysis approach. 4.7.
Outdoor recreation related Federal programs—an inventory and digest. 1.178.
Public access survey of public waters in Central Texas. 1.161, 1.162, 1.164, 1.167, 1.170.
Recreation in a correctional institution. 2.25.
Special services—recreation for the handicapped. 4.22.
Study of the feeding patterns of and hunting pressure on waterfowl attracted to a sanctuary. 1.87.
Surplus game availability in areas of Texas. 1.165, 1.166.
Survey of hunter and fisherman expenditures. 2.4.
Trails for America. 1.181.
Use of Oklahoma Department of Wildlife Conservation lakes for fishing and recreation. 2.68.
Wilderness area classification and problems of private use and land ownership. 1.116.
1965 recreation and park yearbook. 1.104.
1965 salt-water angling survey. 4.19.

PUERTO RICO .... Determination of safe levels of pollution in Puerto Rico. 1.139.
Inventory, evaluation, and conservation of islands in the U.S., Puerto Rico and Virgin Islands. 1.180.

QUESTIONNAIRES
  CAMPERS .... Cooperative forest recreation project with New York State College of Forestry. 2.63.
  CARBON TRACER .... Ontario Provincial Parks travel study using a carbon tracer questionnaire. 4.18.
  ENTREPRENEURS ...... Forest recreation in Louisiana. 1.62.
  Income-producing outdoor recreation on private lands. 3.66.
  FISHERMEN .... A survey of fishermen participation and preferences. 2.24.
  HAND OUT .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.11.
  The spatial distribution and locational analysis of ski resorts in Southern Ontario. 3.68.
  HIKERS .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.8.
  HUNTERS .... The socio-economics of recreational use of the Cache Elk Herd. 3.61.
  MAIL .... Analysis of the characteristics and distribution of the Ohio fisherman population. 2.66.
  Analysis of waterfowl kill card data. 1.194.
  Availability of private land for public hunting in Angelina County, Texas. 1.155.
  Big game hunting pressure survey. 2.60.
  Check of hunter accuracy in response to questionnaires. 4.3.
  Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31, 2.47, 2.76, 2.77, 2.96.
  Consumer analysis of selected forest-oriented recreational activities. 2.92.
  Determination of big game harvest. 1.208.
  Determination of deer hunting pressure in Massachusetts. 2.29.
  Forest-recreation investment opportunities in Iowa. 3.9.
  Game bird hunter questionnaire. 2.101.
  Game kill questionnaire. 2.26.
  Hunter attitude surveys. 2.32.
  Liability insurance programs of rural recreation enterprises in Southern Michigan. 3.15.
  Mail questionnaire survey to evaluate hunting and fishing demands. 2.46.
  Public hunting area utilization survey. 2.65.
  Recreation land acquisition policies and programs in Midwestern metropolitan areas. 1.156.
  Regional comprehensive multipurpose water resources planning studies. 1.117.
  Sportsman's opinion survey. 2.13.
  Spy-blind study to learn accuracy of hunters mail surveys. 4.9.
  Study of methods and procedures in game harvest surveys. 4.8.
  Survey of hunter and fisherman expenditures. 2.4.
  The demand for outdoor recreation in Tennessee. 2.85.
  1967 fish harvest inventory. 2.89.
  MOBILE RECREATION .... International survey of mobile recreation facilities. 1.103.
  PARKS—PUBLIC .... 1965 recreation and park yearbook. 1.104.

RECREATION ADMINISTRATORS .. A study of undergraduate & graduate curriculums in recreation & park administration. 1.89.
  Availability & use of recreation resources for chronically disabled children in the United States. 1.33.
  Problem analysis in outdoor recreation. 1.119.
  Special services—recreation for the handicapped. 4.22.
RECREATIONISTS .... Demand for recreation in the Wildhorse Creek Watershed. 4.17.
  Study of the possibilities and problems in creating living, historical farms. 2.79.
TELEPHONE .... Big game hunting pressure survey. 2.60.
  Leased public hunting area utilization by permit holders. 2.64.
  Survey of effort and success by Oregon anglers. 2.73.
  Telephone survey of game harvest and hunting pressure. 4.16.
TOURISTS .... Demand for recreation in the Wildhorse Creek watershed. 2.71.
  National travel trends quarterly index. 2.86.
  Ontario Provincial Parks travel study using a carbon tracer questionnaire. 4.18.
  The socio-economics of recreational use of the Cache Elk Herd. 3.61.
  Travel and tourism in West Virginia. 2.95.

REGULATIONS
FISHING .... Parvin Lake quality fishing studies. 2.6.
HUNTING .... Antelope population trend estimates and harvest information. 1.110.
  Game bird hunter questionnaire. 2.101.
  Prairie chicken hunting harvest field surveys. 1.111.
  Studies of teal populations in New Mexico. 2.53.

RESOURCE ORGANIZATIONS .... Economic appraisal of local soil, water and other resource organizations. 3.57.

RHODE ISLAND .... An analysis of factors relevant to the development of recreational resources. 1.144.
  Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.77.
  Economic impact of marine-oriented activities in the Southern New England marine region. 3.34.
  Optimal planning of recreational development for Charlestown, R. I. 3.33.

RIFLERY .... National Rifle Association range project. 1.106.

RURAL RECREATION .... An analysis of factors relevant to the development of recreational resources. 1.144.
  Analysis of feasibility of easements and protective covenants for guiding rural land use. 1.187.
  Appraisal of alternative means of economic development of specific local rural areas. 3.60.
  Economic appraisal of impacts of urban growth on rural land use. 3.55.
  Economic impact of a major recreational development in a rural Ohio county. 3.27.
  Liability insurance programs of rural recreation enterprises in Southern Michigan. 3.15.
  Provisions in leasing contracts and rental rates paid for rural lands in Illinois. 3.37.
  Study of the possibilities and problems in creating living, historical farms. 2.79.
  The demand structure for rural recreation. 2.75.
  The economics of outdoor recreation as a use of rural lands. 3.56.
  The utilization of rural land in Tompkins County, New York. 1.42.

SAFETY .... Incorporating scenic considerations into highway investment decisions. 1.75.
  National Rifle Association range project. 1.106.

SEA NETTLES .... Enhancement of recreational uses of estuarine waters through control of sea nettles. 1.67.

SIGHTSEEING .... The socio-economics of recreational use of the Cache Elk Herd. 3.63.

SIMULATED TRAMPLING .... Vegetative response to nine patterns of simulated recreational use. 4.26.

SKIING .... Factors influencing use intensity of ski areas in Vermont. 1.204.
  Hawaii State comprehensive outdoor recreation plan. 1.56.
  Michigan outdoor recreation demand study. 4.6.

The social and economic effects of a ski industry upon selected Vermont communities. 3.65.
The spatial distribution and locational analysis of ski resorts in Southern Ontario. 3.68.

SOCIAL IMPACT
HUNTING .... The socio-economics of recreational use of the Cache Elk Herd. 3.63.
LAND USE .... Feasibility of integrating social and physical land use factors in recreation planning process. 1.79.
RECREATIONAL ACTIVITY .... Factors affecting resource use and income potential in the Ozarks of Missouri. 3.19.
RURAL RECREATION.. Economic and social values in alternate use of rural lands in Pennsylvania. 2.74.
SKI RESORTS .... The social and economic effects of a ski industry upon selected Vermont communities. 3.65.

SOIL STUDIES .... Changes in campground vegetation and soils in relation to fertilizer, water and visitor use. 1.199.
Ecology and management of Boundary Waters Canoe Area campsites. 1.90.
Establishment and maintenance of vegetation on highway rights-of-way. 1.159.
General survey of Kansas State waters for fishing. 1.61.
Growth of mixed species plantations. 1.157.
Impact of recreationists on campsites in Utah. 1.198.
Recreation potential in a second-growth redwood stand—north coast of California. 1.58.
Woody and herbaceous plants for roadside ground cover. 1.60.

SOUTH AFRICA .... Flatland Johannesburg—a study of a densely populated urban area. 2.100.

SOUTH CAROLINA .... The South Carolina travel trade. An economic analysis. 3.48.
Turfgrass development, production and management for utility, beauty and recreational facilities. 1.21.

SOUTH DAKOTA .... Economic potentials for water resources development in South Dakota. 3.36.
Establishment of tree plantings to enhance recreation potential of selected sites. 1.148.
Fishing pressure estimate and economic survey on trout waters in the Black Hills of South Dakota. 2.80.
Irrigation & related water resources development of the East Dakota conservancy sub-district. 1.149.
Missouri River national recreation area study. 1.182.
Water quality and primary production of South Dakota lakes. 1.150.

STANDARDS
CAPACITY—LAND ...... Carrying capacity of different forest sites for recreational uses in Missouri. 2.40.
Collection and application of information on use of forest recreation facilities. 1.151.
Concepts, definitions, and standards involved in the recreational carrying capacity of land. 4.5.
Developing agricultural land in recreational uses under private ownership. 3.50.
Development of recreational space standards for any given population. 1.36.
North Carolina outdoor recreation planning system. 1.142.
Planning to prevent conflict in rural land uses. 4.1.
Recreation design criteria and demand. 4.23.
State comprehensive outdoor recreation plan, North Dakota. 1.125.
CAPACITY—WATER .... Concepts, definitions, and standards involved in the recreational carrying capacity of land. 4.5.
Criteria for evaluating the quality of water based recreation facilities. 2.61.
North Carolina outdoor recreation planning system. 1.142.
Recreation design criteria and demand. 4.23.
FACILITIES .... Recreational facilities inventory, demand and plan for Colorado. 1.83.

SURVEYS
CAMPING .... Analysis of the operation and management of youth camps in Vermont. 3.64.
DEMAND .... Study of outdoor recreation demand based on analyses of National Recreation Survey 1960–1965. 1.146.
The demand for outdoor recreation facilities in Philadelphia, Baltimore, and Washington, D. C. 2.10.
The demand for outdoor recreation in Tennessee. 2.85.

FISHING .... A fishery survey of the Connecticut River. 1.35.
  1965 salt-water angling survey. 4.19.

FOREST RECREATION .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.47.
  Estimating recreational visits and use on unattended sites. 4.2.
  Forest recreational use of private-owned land in Garrett Co., Maryland. 1.68.
  Recreation use by sample counts and continuous records. 4.24.

GOVERNMENT PROGRAMS .... Outdoor recreation-related Federal programs—an inventory and digest. 1.178.

HUNTING .... A study of hunting and duck populations on a selected area in West-central Minnesota. 1.86.
  Antelope population trend estimates and harvest information. 1.110.
  Big game hunting pressure survey. 2.60.
  Determination of big game harvest. 1.208.
  Hunter attitude surveys. 2.32.
  Hunter survey and bag check. 2.45.
  Mail questionnaire survey to evaluate hunting and fishing demands. 2.46.
  Postcard survey of deer hunters. 2.48.
  Prairie chicken hunting harvest field surveys. 1.111.

PARTICIPATION .... The 1965 National Recreation Survey. 2.87.

PRIVATE ENTERPRISES .... Study of private outdoor recreation enterprises. 1.176.

RURAL RECREATION.. Provisions in leasing contracts and rental rates paid for rural lands in Illinois. 3.37.

SPORTSMEN .... Sportsman's opinion survey. 2.13.

WATER RECREATION .... A survey and evaluation of small artificial recreational ponds in Central Massachusetts. 1.71.
  Public access survey of public waters in Central Texas. 1.161, 1.162, 1.164.
  Public access survey of public waters in Eastern Texas. 1.174.
  State-wide lake and stream inventory of Minnesota. 1.85.
  State-wide lake and stream survey of Mississippi. 1.91.
  Water inventory of upper Swan, Salmon River and high alkaline Eureka Lakes of Montana. 1.98.
  Water quality, fish population and vegetation control of State Park lakes in Texas. 1.168.

SWIMMING .... Competitive recreational uses of selected Iowa lakes. 2.27.
  Criteria for evaluating the quality of water based recreation facilities. 2.61.
  Enhancement of recreational uses of estuarine waters through control of sea nettles. 1.67.
  Eutrophication in water resources of New York State. 1.39.
  Hawaii State comprehensive outdoor recreation plan. 1.56.
  Information center—recreation for the handicapped. 4.21.
  Planning, improving, protecting and managing forest recreation. 1.127.
  The effect of quality factors on the demand for water-based recreation. 2.44.

TAXATION .... A case study in providing local recreation land in a subdivision. 1.77.
  A method of assigning a market value to unique recreation. 3.14.
  Basic land economic data for selected areas of Northern Wisconsin. 3.71.
  Illinois tourism study, an economic analysis. 3.43.
  Knoxville annual tourist survey. 3.38.
  North Carolina travel survey, an economic analysis. 3.47.
  Optimal planning of recreational development for Charlestown, R. I. 3.33.
  The Kansas City tourist trade, an economic analysis. 3.40.
  The South Carolina travel trade, an economic analysis. 3.48.
  The Tennessee tourist trade, an economic analysis. 3.49.
  The travel business in Kentucky, an economic analysis. 3.45.
  The travel business in Louisville, Kentucky. 3.39.
  Tourists and Alabama business, an economic analysis. 3.41.
  Travel in Arkansas, an economic analysis. 3.42.
  Travel in Iowa, an economic analysis. 3.44.
  Travel in Mississippi, an economic analysis. 3.46.

TENNESSEE .... Creel census and economic survey of Dale Hollow Tailwater in Tennessee. 2.84.
  Growth of mixed species plantations. 1.157.

Illinois tourism study, an economic analysis. 3.43.
Knoxville annual tourist survey. 3.38.
North Carolina travel survey, an economic analysis. 3.47.
The demand for outdoor recreation in Tennessee. 2.85.
The Kansas City tourist trade, an economic analysis. 3.40.
The South Carolina travel trade, an economic analysis. 3.48.
The Tennessee tourist trade, an economic analysis. 3.49.
The travel business in Kentucky, an economic analysis. 3.45.
The travel business in Louisville, Kentucky. 3.39.
Tourists and Alabama business, an economic analysis. 3.41.
Travel in Arkansas, an economic analysis. 3.42.
Travel in Iowa, an economic analysis. 3.44.
Travel in Mississippi, an economic analysis. 3.46.

TEXAS .... Availability of private land for public hunting in Angelina County, Texas. 1.155.
Developing agricultural land in recreational uses under private ownership. 3.50.
Establishment and maintenance of vegetation on highway rights-of-way. 1.159.
Investigation of fish killing pollution by sportsmen and game wardens in Texas. 1.173.
Pollution studies of waters in North-central Texas. 1.163.
Public access survey of public waters in Central Texas. 1.161, 1.162, 1.164, 1.167, 1.170.
Public access survey of public waters in Eastern Texas. 1.174.
Public access survey of public waters in Northeastern Texas. 1.160.
Public access survey of public waters in Southern Texas. 1.172.
Public lake access and facilities survey. 1.171, 1.209.
Recreation land acquisition policies and programs in Midwestern metropolitan areas. 1.156.
Surplus game availability in areas of Texas. 1.165, 1.166.
Surplus game harvest, Black Gap wildlife management area. 1.169.
Survey of Texas State park waters. 1.175.
Water quality, fish population and vegetation control of State Park lakes in Texas. 1.168.

THERAPEUTIC RECREATION .... Availability & use of recreation resources for chronically disabled children in the United States. 1.33.
Demonstration camp for male adolescent diabetics. 3.72.
Information center—recreation for the handicapped. 4.21.
Plans for expansion & use of community recreation resources for the handicapped. 1.34.
Production of a training film for recreation leaders working with the mentally retarded. 1.72.
Recreation in a correctional institution. 2.25.
South Brooklyn youth leadership project. 2.57.
Special services—recreation for the handicapped. 4.22.
Summer camp for asthmatic children and fall, winter, spring camp for the chronically mentally ill. 2.94.
The pre-hospital leisure-time activities of mental patients. 4.10.

TOLL BOOTH COUNTS .... Study of methods and procedures in game harvest surveys. 4.8.

TOURING .... A study of some effects of junkyard screening and billboard density. 1.140.
A study of tourism development in the Coastal Plains Area. 1.52.
Consumer decisions affecting vacation patterns. 2.91.
Factors affecting resource use and income potential in the Ozarks of Missouri. 3.19.
Hawaii State comprehensive outdoor recreation plan. 1.56.
Incorporating scenic considerations into highway investment decisions. 1.75.
National travel trends quarterly index. 2.86.
Study of the impact of outdoor advertising in Missouri. 3.18.
The man-land relationship when driving for pleasure in Waterloo County. 2.93.
Tourism development in the Chattahoochee-Flint area of Georgia. 1.54.
Tourism development in the Georgia mountains area. 1.53.
Travel and tourism in West Virginia. 2.95.

Trends in urbanization, industrialization, and recreational use of arid lands. 1.12.
University research study series—recreation travel and mobility. 2.19.

TRAFFIC COUNTERS ...... A test of printout traffic counters for estimating visitor use at recreation areas. 4.25.
Annual utilization of Colliers Mills-Success Lake restoration area by hunters. 2.49.
Factors affecting resource use and income potential in the Ozarks of Missouri. 3.19.
Rock Creek creel census—summer census. 2.42.

TRAILS .... Arizona outdoor recreation planning project. 1.11.
Establishing and developing the self-guiding trail as an interpretive media in urban natural areas. 2.35.
The Trails study. 1.181.

TRAINING
HEALTH PERSONNEL.. Public Health Service short term course for professional health personnel working with the retarded. 1.105.
PERSONNEL .... A study of undergraduate & graduate curriculums in recreation & park administration. 1.89.
Plans for expansion & use of community recreation resources for the handicapped. 1.34.
Production of a training film for recreation leaders working with the mentally retarded. 1.72.
Recreation in a correctional institution. 2.25.
South Brooklyn youth leadership project. 2.57.
WILDLAND RECREATION MANAGERS .... A model option for instruction in wildland recreation management at the college undergraduate level. 1.129.

TRANSPORTATION .... Development of water recreation in lakes and rivers of the Bristol Bay region of Alaska. 1.4.
Economic feasibility and impact of vertical or short take-off and landing aircraft for Appalachian region. 3.69.
Illinois tourism study, an economic analysis. 3.43.
Knoxville annual tourist survey. 3.38.
National travel trends quarterly index. 2.86.
North Carolina travel survey, an economic analysis. 3.47.
The Kansas City tourist trade, an economic analysis. 3.40.
The South Carolina travel trade, an economic analysis. 3.48.
The Tennessee tourist trade, an economic analysis. 3.49.
The travel business in Kentucky, an economic analysis. 3.45.
The travel business in Louisville, Kentucky. 3.39.
Tourists and Alabama business, an economic analysis. 3.41.
Travel in Arkansas, an economic analysis. 3.42.
Travel in Iowa, an economic analysis. 3.44.
Travel in Mississippi, an economic analysis. 3.46.
University research study series—recreation travel and mobility. 2.19.

URBANIZATION .... Availability & use of recreation resources for chronically disabled children in the United States. 1.33.
Flatland Johannesburg—a study of a densely populated urban area. 2.100.
Organizational arrangements in urban river basins to provide recreation and pollution control. 1.78.
South Brooklyn youth leadership project. 2.57.
Trends in urbanization, industrialization, and recreational use of arid lands. 1.12.

USER CHARACTERISTICS
AGE
Campers .... Factors influencing campground and campsite selection. 2.36.
Fishermen .... Analysis of the characteristics and distribution of the Ohio fisherman population. 2.66.
Creel census on five lakes in Wisconsin. 2.97.
Forest Recreationists.... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.96.
Handicapped .... University outdoor recreation research study service—special problems. 1.49.
Hunters .... Determination of deer hunting pressure in Massachusetts. 2.29.
Recreationists .... Demand of the metropolitan population in Missouri for rural recreation facilities. 2.41.
Resource adjustments to provide income from private outdoor recreation enterprises. 3.32.

University research study series—demand factors for outdoor recreation activities. 2.17.

EXPENDITURES
- Campers .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.11, 2.47, 2.77.
  - Forest recreation demand analysis. 2.5.
  - Recreational values of water in the major reservoirs of New Mexico. 1.115.
- Fishermen .... Analysis of the characteristics and distribution of the Ohio fisherman population. 2.66.
  - Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31, 2.76.
  - Consumer analysis of selected forest-oriented recreational activities. 2.92.
  - Creel census and economic survey of Dale Hollow Tailwater in Tennessee. 2.84.
  - Recreational values of water in the major reservoirs of New Mexico. 1.115.
  - Survey of hunter and fisherman expenditures. 2.4.
- Hunters .... Big game hunting pressure survey. 2.60.
  - Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31, 2.76.
  - Consumer analysis of selected forest-oriented recreational activities. 2.92.
  - Determination of deer hunting pressure in Massachusetts. 2.29.
  - Game kill questionnaire. 2.26.
  - Survey of hunter and fisherman expenditures. 2.4.
  - Upland game investigations—Fort Cobb Crow study. 2.70.
- Recreationists .... Demand for recreation in the Wildhorse Creek Watershed. 4.17.
  - Recreation design criteria and demand. 4.23.
  - Recreational facilities in Northern Wisconsin. 1.207.
  - The demand for outdoor recreation in Tennessee. 2.85.
- Tourists .... Illinois tourism study. An economic analysis. 3.43.
  - Knoxville annual tourist survey. 3.38.
  - North Carolina travel survey, an economic analysis. 3.47.
  - The Kansas City tourist trade, an economic analysis. 3.40.
  - The South Carolina travel trade, an economic analysis. 3.48.
  - The Tennessee tourist trade, an economic analysis. 3.49.
  - The travel business in Kentucky, an economic analysis. 3.45.
  - The travel business in Louisville, Kentucky. 3.39.
  - Tourists and Alabama business, an economic analysis. 3.41.
  - Travel in Arkansas, an economic analysis. 3.42.
  - Travel in Iowa, an economic analysis. 3.44.
  - Travel in Mississippi, an economic analysis. 3.46.

MOTIVATION
- Campers .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.11, 2.47, 2.77.
  - Forest recreation demand analysis. 2.5.
  - Planning, improving, protecting and managing forest recreation. 1.127.
- Fishermen .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31.
- Forest Recreationists .. Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.96.
- Hikers .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.8.
- Hunters .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31.
  - Forest fire prevention through public interest in game. 1.205.
- Rural Recreationists .... The demand structure for rural recreation. 2.75.
- Tourists .... Consumer decisions affecting vacation patterns. 2.91.
  - The man-land relationship when driving for pleasure in Waterloo County. 2.93.
  - Travel and tourism in West Virginia. 2.95.

MOVEMENT
- Campers .... Factors influencing campground and campsite selection. 2.36.
- Hunters .... County of residence of hunters checked on the management areas. 2.14.
- Recreationists .... The demand for outdoor recreation in Tennessee. 2.85.
  - University research study series—demand factors for outdoor recreation activities. 2.18.
- Tourists .... Ontario Provincial Parks travel study using a carbon tracer questionnaire. 4.18.
  - University research study series—recreation travel and mobility. 2.19.

PERFORMANCE
- Campers
  - Human impact on vegetation in Glacier National Park. 2.12.
- Fishermen
  - A survey of fishermen participation and preferences. 2.24.
  - Cost-harvest ratio from Southeastern New Mexico winter trout waters. 2.52.
  - Creel census and economic survey of Dale Hollow Tailwater in Tennessee. 2.84.
  - Creel census and usage studies on Ute, Lake Van, and Chicosa Lake. 2.55.
  - Creel census on five lakes in Wisconsin. 2.97.
  - Creel census, fishing pressure and management of Lake Seminole and Lake Blackshear in Georgia. 1.47.
  - Effects of fly-fishing only on a brook trout population. 2.99.
  - Effects of restrictive size and bag limits on a wild brook trout population. 2.98.
  - Fishery dynamics, Florida Bay. 1.73.
  - General survey of Kansas State waters for fishing. 1.61.
  - Leased public hunting area utilization by permit holders. 2.64.
  - Sport fishery creel census of Currituck Sound in North Carolina. 2.62.
  - The harvest of salmon and steelhead as determined from salmon and steelhead permits. 2.23.
  - The reliability of partial creel checks as estimators of season totals. 4.14.
  - Use of Oklahoma Department of Wildlife Conservation lakes for fishing and recreation. 2.68.
  - 1967 fish harvest inventory. 2.89.
- Forest Recreationists
  - Performance traits of forest recreationists, a behavioral study. 2.22.
  - The effect of State forests and parks on public recreational use of private forests in Louisiana. 3.11.
- Hikers
  - Establishing and developing the self-guiding trail as an interpretive media in urban natural areas. 2.35.
- Hunters
  - Analysis of waterfowl kill card data. 1.194.
  - Big game hunters, hunting activities and forest access in North Carolina. 2.81.
  - Check of hunter accuracy in response to questionnaires. 4.3.
  - Determination of deer hunting pressure in Massachusetts. 2.29.
  - Environmental changes, waterfowl usage, hunter pressure and feasibility of salt marsh impoundments. 1.121.
  - Game bird hunter questionnaire. 2.101.
  - Hunter attitude surveys. 2.32.
  - Leased public hunting area utilization by permit holders. 2.64.
  - Postcard survey of deer hunters. 2.48.
  - Small game hunters, hunting activities and forest access in North Carolina. 2.82.
  - Snow vehicle/caribou harvest study. 2.3.
  - Spy-blind study to learn accuracy of hunters' mail surveys. 4.9.
  - Studies of teal populations in New Mexico. 2.53.
  - Upland game investigations—Fort Cobb Crow study. 2.70.
  - Utilization of wildlife management areas. 2.30.
  - Waterfowl harvest and hunting pressure. 2.2.
  - Waterfowl production, utilization, and harvest on salt marsh areas. 2.50.
- Tourists
  - Travel and tourism in West Virginia. 2.95.
- Urban Recreationists
  - Development of recreational space standards for any given population. 1.36.

PHYSICAL
- Campers
  - Summer camp for asthmatic children and fall, winter, spring camp for the chronically mentally ill. 2.94.
- Cave Visitors
  - Cave climate of Carlsbad Caverns National Park in New Mexico. 1.192.
- Handicapped
  - Availability & use of recreation resources for chronically disabled children in the United States. 1.33.
  - Plans for expansion & use of community recreation resources for the handicapped. 1.34.
  - Special services—recreation for the handicapped. 4.22.
- Urban Recreationists
  - Special problems related to field of outdoor recreation. 1.49.

PREFERENCES
- Boaters
  - A spatial analysis of recreational boating in selected areas of Ohio. 2.67.
- Campers
  - Analysis of factors influencing campers' stay in Waterloo recreation area of Michigan. 2.34.
  - Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.11.

Cooperative forest recreation project with New York State College of Forestry. 2.63.
Factors contributing to more efficient recreation planning for Michigan State forest campgrounds. 1.81.
Factors influencing campground and campsite selection. 2.36.
Public and Private Recreation Management Guides, Eastern United States. 1.127.
Social and ecological problems of northwoods wilderness-type recreation. 1.124.

Fishermen .... A survey of fishermen participation and preferences. 2.24.
Analysis of the characteristics and distribution of the Ohio fisherman population. 2.66.
Recreation value of water in a mutually exclusive setting. 1.195.

Forest Recreationists.... Analysis of factors influencing attendance at forest recreation sites. 2.39.
Some ecological implications of the management of Itasca State Park to meet recreational objectives. 1.88.
The use of eye pupillary response in forest aesthetic studies. 4.13.

Hunters .... Evaluation of public use of state game areas in Southern Michigan. 2.33.
Hunter attitude surveys. 2.32.
Public hunting area utilization survey. 2.65.
Study of the Alabama deer hunter. 2.1.

Non-Hunters .... Evaluation of public use of State game areas in Southern Michigan. 2.33.

Recreationists .... Optimal planning of recreational development for Charlestown, R. I. 3.33.
The 1965 National Recreation Survey. 2.87.
University outdoor recreation research study series—present demand trends. 2.20.

Rural Recreationists .... An analysis of factors relevant to the development of recreational resources. 1.144.
Resource adjustments to provide income from private outdoor recreation enterprises. 3.32.
Study of the possibilities and problems in creating living, historical farms. 2.79.

Skiers .... The spatial distribution and locational analysis of ski resorts in Southern Ontario. 3.68.

Tourists .... A study of some effects of junkyard screening and billboard density. 1.140.
A study of tourism development in the Coastal Plains Area. 1.52.
Tourism development in the Chattahoochee-Flint area of Georgia. 1.54.
Tourism development in the Georgia mountains area. 1.53.

Water Recreationists.... Criteria for evaluating the quality of water-based recreation facilities. 2.61.

PSYCHOLOGICAL .... The effect of quality factors on the demand for water-based recreation. 2.44.
The pre-hospital leisure-time activities of mental patients. 4.10.

REACTION TO REGULATIONS

Campers .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.11, 2.47, 2.77.

Fishermen .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31.
Consumer analysis of selected forest-oriented recreational activities. 2.92.
Parvin Lake quality fishing studies. 2.6.

Hunters .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31.
Consumer analysis of selected forest-oriented recreational activities. 2.92.
Hunter attitude surveys. 2.32.

Sportsmen .... Sportsman's opinion survey. 2.13.

RESIDENCE

Boaters .... A spatial analysis of recreational boating in selected areas of Ohio. 2.67.

Fishermen .... Rock Creek creel census—summer census. 2.42.
Sport fishery creel census of Currituck Sound in North Carolina. 2.62.

Forest Recreationists.... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.96.
Recreational use of wilderness areas and requirements in relation to other forest uses. 1.136.
The effect of State forests and parks on public recreational use of private forests in Louisiana. 3.11.

Hunters .... Big game hunting pressure survey. 2.60.
County of residence of hunters checked on the management areas. 2.14.
Determination of deer hunting pressure in Massachusetts. 2.29.
Utilization of wildlife management areas. 2.30.

Recreationists .... Recreation design criteria and demand. 4.23.
  University outdoor recreation research study series—present demand trends. 2.20.
Water Recreationists.... An investigation of factors affecting the intensity of use of water recreation facilities. 2.28.

RETARDED .... Information center—recreation for the handicapped. 4.21.
  Production of a training film for recreation leaders working with the mentally retarded. 1.72.

SATISFACTION
Campers .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.11, 2.47, 2.77.
Fishermen .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31.
  Cooperative forest recreation project with New York State College of Forestry. 2.63.
  Creel census, fishing pressure and management of Lake Seminole and Lake Blackshear in Georgia. 1.47.
  Sport fishery catch statistics for scup. 2.59.
  Sport fishery catch statistics for tautog. 2.58.
  St. Johns River fishery project. 1.45.
  Survey of effort and success by Oregon anglers. 2.73.
  The reliability of partial creel checks as estimators of season totals. 4.14.
Forest Recreationists.... Consumer analysis of selected forest-oriented recreational activities. 2.92.
Hunters .... A study of hunting and duck populations on a selected area in West-central Minnesota. 1.86.
  Annual utilization of Colliers Mills-Success Lake restoration area by hunters. 2.49.
  Antelope population trend estimates and harvest information. 1.110.
  Big game hunters, hunting activities and forest access in North Carolina. 2.81.
  Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9, 2.31.
  Postcard survey of deer hunters. 2.48.
  Small game hunters, hunting activities and forest access in North Carolina. 2.82.
  Spy-blind study to learn accuracy of hunters' mail surveys. 4.9.
  Surplus game harvest, Black Gap wildlife management area. 1.169.
  Waterfowl harvest and hunting pressure. 2.2.

SEX
Fishermen .... Creel census on five lakes in Wisconsin. 2.97.
Forest Recreationists.... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.96.

SOCIO-ECONOMIC
Campers .... Analysis of factors influencing campers' stay in Waterloo recreation area of Michigan. 2.34.
  Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.77.
  Cooperative forest recreation project with New York State College of Forestry. 2.63.
  Forest recreation demand analysis. 2.5.
  Public and private forest recreation management guides, Eastern United States. 1.127.
Criminals .... Recreation in a correctional institution. 2.25.
Fishermen .... Analysis of the characteristics and distribution of the Ohio fisherman population. 2.66.
  Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9.
  Evaluation of trout stocking program in the Lake Mohave area. 1.7.
Forest Recreationists.... Performance traits of forest recreationists, a behavioral study. 2.22.
Hospital Clientele .... The pre-hospital leisure-time activities of mental patients. 4.10.
Hunters .... Big game hunters, hunting activities and forest access in North Carolina. 2.81.
  Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.9.
  Small game hunters, hunting activities and forest access in North Carolina. 2.82.
  The socio-economics of recreational use of the Cache Elk Herd. 3.61, 3.63.
Juvenile Delinquents.... South Brooklyn youth leadership project. 2.57.
Recreationists .... Comprehensive outdoor recreation plan, State of Missouri. 1.84.
  Demand for recreation in the Wildhorse Creek watershed. 4.17.

The demand for outdoor recreation facilities in Philadelphia, Baltimore, and Washington, D. C. 2.10.
The 1965 National Recreation Survey. 2.87.
University outdoor recreation research study series—present demand trends. 2.20.
University outdoor recreation research study service—special problems. 1.49.
University research study series—demand factors for outdoor recreation activities. 2.17, 2.18.

Rural Recreationists .... Demand of the metropolitan population in Missouri for rural recreation facilities. 2.41.

Sightseers .... The socio-economics of recreational use of the Cache Elk Herd. 3.61, 3.63.

Tourists .... Demand for recreation in the Wildhorse Creek Watershed. 2.71.
Measurement of the aesthetic appeal of managed forest & wildland roadside environments. 2.16.
Travel and tourism in West Virginia. 2.95.

Water Recreationists.... An investigation of factors affecting the intensity of use of water recreation facilities. 2.28.

Wilderness Recreationists .... Recreational use of wilderness areas and requirements in relation to other forest uses. 1.136.

USE PATTERNS

Campers .... Environmental factors in campground rehabilitation and protection. 1.29.
Human impact on vegetation in Glacier National Park. 2.12.

Farm Recreationists .... Economic appraisal of opportunities for outdoor recreation on farms in Southeastern Ohio. 3.51.

Fishermen .... Annual angler harvest from selected lakes. 1.130.
Recreation value of water in a mutually exclusive setting. 1.195.

Forest Recreationists.... Cooperative forest recreation research—Utah State University. 1.202.
Estimating recreational visits and use on unattended sites. 4.2.
Recreation use by sample counts and continuous records. 4.24.
Recreational use of wilderness type areas. 1.136.

Hunters .... Annual utilization of Colliers Mills-Success Lake restoration area by hunters. 2.49.

Recreationists .... Recreation design criteria and demand. 4.23.
Recreation site usage in the Florida Everglades wildlife management area. 2.15.
Study of outdoor recreation demand based on analyses of National Recreation Survey 1960–1965. 1.146.
The demand for outdoor recreation facilities in Philadelphia, Baltimore, and Washington, D. C. 2.10.
University outdoor recreation research study series—present demand trends. 2.20.

Rural Recreationists .... Developing agricultural land in recreational uses under private ownership. 3.50.

Swimmers .... Effect of membership in private recreation clubs and membership use of public recreation lands. 2.38.

Tourists .... Consumer decisions affecting vacation patterns. 2.91.
Measurement of the aesthetic appeal of managed forest & wildland roadside environments. 2.16.
National travel trends quarterly index. 2.86.
The man-land relationship when driving for pleasure in Waterloo County. 2.93.
Trends in urbanization, industrialization, and recreational use of arid lands. 1.12.

Water Recreationists.... Economic and legal factors in providing, using and managing water resources in agriculture. 3.70.
Economic study of land and water oriented recreation facilities in Maryland. 3.12.

UTAH .... A test of printout traffic counters for estimating visitor use at recreation areas. 4.25.
Analysis of waterfowl kill card data. 1.194.
Changes in campground vegetation and soils in relation to fertilizer, water and visitor use. 1.199.
Consumer decisions affecting vacation patterns. 2.91.
Develop planning techniques, manage wild lands and stimulate graduate research. 1.201.
Development of comprehensive inventory systems for recreation planning in Utah. 1.200.
Feasibility of predicting durability of recreation sites under managed and unmanaged conditions. 1.196.
Impact of recreationists on campsites in Utah. 1.198.
Recreation development in Bear Lake area. 3.62.

Recreation use by sample counts and continuous records. 4.24.
Recreation value of water in a mutually exclusive setting. 1.195.
Social and psychological factors associated with proposed changes in water use patterns. 2.90.
Stimulate and guide graduate study in forest recreation at Utah State University. 1.202.
The socio-economics of recreational use of the Cache Elk Herd. 3.61, 3.63.
Vegetative response to nine patterns of simulated recreational use. 4.26.
1967 fish harvest inventory. 2.89.

VEGETATION
AQUATIC WEEDS .... Eutrophication in water resources of New York State. 1.39.
General survey of Kansas State waters for fishing. 1.61.
Investigation of aquatic weed problems and means of control with emphasis on brazilian waterweed. 1.134.
Water quality, fish population and vegetation control of State Park lakes in Texas. 1.168.
CAMPSITES .... Changes in campground vegetation and soils in relation to fertilizer, water and visitor use. 1.199.
Ecology and management of Boundary Waters Canoe Area campsites. 1.90.
Environmental factors in campground rehabilitation and protection. 1.29.
Impact of recreationists on campsites in Utah. 1.198.
DISEASES .... Guides for forest land management under accelerated recreation demands and intensive land use. 3.4.
FOREST AREAS .... Collection and application of information on use of forest recreation facilities. 1.151.
Determination of ecological factors important to management of mountain meadows. 1.193.
Horticultural methods for planting, managing and enhancing vegetation on forest recreation sites. 1.19.
National land use inventory. 1.188.
Planning, improving, protecting and managing forest recreation. 1.127.
Recreation potential in a second-growth redwood stand—north coast of California. 1.58.
Some ecological implications of the management of Itasca State Park to meet recreational objectives. 1.88.
Vegetative response to nine patterns of simulated recreational use. 4.26.
Weather and climate of scaled quail study areas. 1.112.
Western wilderness recreation. 1.201.
HORTICULTURAL PLANTS .... Establishment of tree plantings to enhance recreation potential of selected sites. 1.148.
Fertilization and culture of Hawaii tree crops. 1.57.
Growth of mixed species plantations. 1.157.
IMPROVEMENT
Forest Areas .... Magnitude & effects of site deterioration & trail erosion induced by recreationists. 2.83.
Oceanside .... A study of the ecology of sand dunes in relation to their stabilization. 1.123.
Roadside Cover .... Establishment and maintenance of vegetation on highway rights-of-way. 1.159.
Methods of establishing and caring for plants used for roadside shoulders and channels. 1.114.
Woody and herbaceous plants for roadside ground cover. 1.60.
PUBLIC PARKS .... Human impact on vegetation in Glacier National Park. 2.12.
TURF GRASS .... Establishment and management of Southern turf grass. 1.93.
Turfgrass development, production and management for utility, beauty and recreational facilities. 1.21.

VEHICLE COUNTS .... A study of hunting and duck populations on a selected area in West-central Minnesota. 1.86.
Conservation officer creel census on lakes and streams. 2.51.
Evaluation of public use of State game areas in Southern Michigan. 2.33.
Recreation site usage in the Florida Everglades wildlife management area. 2.15.
Recreation use by sample counts and continuous records. 4.24.
The effect of State forests and parks on public recreational use of private forests in Louisiana. 3.11.

VERMONT .... Analysis of the operation and management of youth camps in Vermont. 3.64, 3.67.
Consumer analysis of selected forest-oriented recreational activities. 2.92.
Economics of multiple use of forest land and methodology for its classification. 1.203.
Factors influencing use intensity of ski areas in Vermont. 1.204.
Income-producing outdoor recreation on private lands. 3.66.
The social and economic effects of a ski industry upon selected Vermont communities. 3.65.

VIRGIN ISLANDS .... Inventory, evaluation, and conservation of islands in the U.S., Puerto Rico and Virgin Islands. 1.180.

VOLUNTEER REPORTING .... Utilization of wildlife management areas. 2.30.

WASHINGTON .... Recreational use of wilderness areas and requirements in relation to other forest uses. 1.136.
Selection of a method for estimating the demand for non-market water resources. 4.27.

WATER MANAGEMENT
  ALTERNATIVE USE .... Alternative economic responses to the acid mine drainage problem in Southeastern Ohio. 3.25.
  An inventory and study of beaver impounded water in Mississippi. 1.92.
  Competitive recreational uses of selected Iowa lakes. 2.27.
  Development of water recreation in lakes and rivers of the Bristol Bay region of Alaska. 1.4.
  Impact of water based recreation. 1.40.
  Multiple purpose water resource investigations. 1.41.
  Recreation value of water in a mutually exclusive setting. 1.195.
  The economics and administration of water resources. 3.5.
  POLLUTION CONTROL .... A biological inventory of certain streams and impoundments in Alabama. 1.1.
  Alternative economic responses to the acid mine drainage problem in Southeastern Ohio. 3.25.
  Baseline studies on recreational area. Yellowtail Reservoir. 2.43.
  Determination of safe levels of pollution in Puerto Rico. 1.139.
  Ecology of sport fish and sport fishery management in Illinois. 1.59.
  Hydrology of river-based recreation. 1.190.
  Identification, ecology and significance of algae in environmental sanitation. 1.189.
  Industrial water and waste disposal requirements in New Jersey. 1.147.
  Investigation of fish killing pollution by sportsmen and game wardens in Texas. 1.173.
  Irrigation & related water resources development of the South Dakota conservancy sub-district. 1.149.
  Organizational arrangements in the Milwaukee River, Southeastern Wisconsin to provide recreation. 1.78.
  Owyhee district fisheries management investigations (Northeast Nevada). 1.109.
  Pollution studies of waters in North-central Texas. 1.163.
  St. Johns River fishery project. 1.45.
  The effect of quality factors on the demand for water-based recreation. 2.44.
  Water quality and primary production of South Dakota lakes. 1.150.
  Wheeler district fisheries management investigations. 1.107.

WATER QUALITY .... An environmental approach for identifying outdoor recreation planning regions. 1.154.
Effect of recreation use and development on water quality of Lake of Egypt in Illinois. 1.153.
Enhancement of recreational uses of estuarine waters through control of sea nettles. 1.67.
General survey of Kansas State waters for fishing. 1.61.
Hydrologic parameters controlling recreational use of Minnesota rivers. 1.191.
Hydrology of river-based recreation. 1.190.
Impact of land use on water quality within a forested mountain watershed. 1.30.
Industrial water and waste disposal requirements in New Jersey. 1.147.

Inventory of waters for fishing in Northern Montana. 1.96.
Multiple purpose water resource investigations. 1.41.
Selection of a method for estimating the demand for non-market water resources. 4.27.
Social and ecological problems of northwoods wilderness-type recreation. 1.124.
The effect of quality factors on the demand for water-based recreation. 2.44.
Water inventory of upper Swan, Salmon River, and high alkaline Eureka Lakes of Montana. 1.98.
Water quality and primary production of South Dakota Lakes. 1.150.
Water quality investigations to determine feasibility of recreational reservoir on Swatara Creek. 1.206.
Water quality, fish population and vegetation control of State Park lakes in Texas. 1.168.

WATER RECREATION .... A study of the ecology of sand dunes in relation to their stabilization. 1.123.
An investigation of factors affecting the intensity of use of water recreation facilities. 2.28.
Demand for water based recreational activities in Nevada. 3.20.
Economic and legal factors in providing, using and managing water resources in agriculture. 3.70.
Economic and social values in alternate use of rural lands in Pennsylvania. 2.74.
Economic impact of marine-oriented activities in the Southern New England marine region. 3.34.
Effect of recreation use and development on water quality of Lake of Egypt in Illinois. 1.153.
Hydrologic parameters controlling recreational use of Minnesota rivers. 1.191.
Impact of water based recreation. 1.40.
Investigation of aquatic weed problems and means of control with emphasis on brazilian waterweed. 1.134.
Irrigation & related water resources development of the South Dakota conservancy sub-district. 1.149.
Missouri River National recreation area study. 1.182.
Recreational values of water in the major reservoirs of New Mexico. 1.115, 2.56.
Regional comprehensive multi-purpose water resources planning studies. 1.117.
Social and ecological problems of northwoods wilderness-type recreation. 1.124.
The impact of water export on the area of origin. 1.18.
Water quality investigations to determine feasibility of recreational reservoir on Swatara Creek. 1.206.

WATER RESOURCES
ACCESS .... A fishery survey of the Connecticut River. 1.35.
Access and reservoir site investigations. 1.108.
Catalog of inland fishing waters. 1.122.
Development of water recreation in lakes and rivers of the Bristol Bay region of Alaska. 1.4.
General survey of Kansas State waters for fishing. 1.61.
Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.3.
Inventory of waters for fishing in Northern Montana. 1.96.
Public access survey of public waters in Central Texas. 1.161, 1.162, 1.167, 1.170.
Public access survey of public waters in Northeastern Texas. 1.160.
Public lake access and facilities survey. 1.171.
Recreation value of water in a mutually exclusive setting. 1.195.
State-wide lake and stream survey of Mississippi. 1.91.
The effect of quality factors on the demand for water-based recreation. 2.44.
BODIES OF WATER
Artificial Ponds .... A survey and evaluation of small artificial recreational ponds in Central Massachusetts. 1.71.
Inventory of waters for fishing in Eastern Montana. 1.99.
Survey and evaluation of small artificial recreational ponds in Central Massachusetts. 1.70.
Bays .... Determination of safe levels of pollution in Puerto Rico. 1.139.
Enhancement of recreational uses of estuarine waters through control of sea nettles. 1.67.

- Eutrophication in water resources of New York State. 1.39.
- Fishery dynamics, Florida Bay. 1.73.
- Public access survey of public waters in Eastern Texas. 1.174.
- Sport fishery catch statistics for scup. 2.59.
- Sport fishery catch statistics for tautog. 2.58.

Gulfs ....
- Inventory and atlas of Gulf Coast sport fishing facilities. 1.186.

Lakes ....
- Annual angler harvest from selected lakes. 1.130.
- Competitive recreational uses of selected Iowa lakes. 2.27.
- Construction and management of small ponds and impoundments for waterfowl on farmland. 1.141.
- Development of water recreation in lakes and rivers of the Bristol Bay region of Alaska. 1.4.
- Eutrophication in water resources of New York State. 1.39.
- Hawaii State comprehensive outdoor recreation plan. 1.56.
- Impact of water based recreation. 1.40.
- Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.2.
- Use of Oklahoma Department of Wildlife Conservation lakes for fishing and recreation. 2.68.
- Water inventory of upper Swan, Salmon River and high alkaline Eureka Lakes of Montana. 1.98.
- Water quality and primary production of South Dakota Lakes. 1.150.

Public Lakes and Streams ....
- A biological inventory of certain streams and impoundments in Alabama. 1.1.
- An environmental approach for identifying outdoor recreation planning regions. 1.154.
- Conservation officer creel census on lakes and streams. 2.51.
- Creel census, benthos sampling and economic impact of Lake D'Arbonne in Louisiana. 1.63.
- Evaluation of the effects of highway construction on the fish habitat of Little Prickly Pear Creek. 1.95.
- General survey of Kansas State waters for fishing. 1.61.
- Identification, ecology and significance of algae in environmental sanitation. 1.189.
- Inventory and biology of Yellowstone lake and stream fishes. 1.32.
- Inventory of waters for fishing in Northern Montana. 1.96.
- Inventory of waters for fishing in Western Montana. 1.100.
- Owyhee district fisheries management investigations (Northeast Nevada). 1.109.
- Public access survey of public waters in Central Texas. 1.161, 1.162, 1.164, 1.167, 1.170.
- Public access survey of public waters in Northeastern Texas. 1.160.
- Public lake access and facilities survey. 1.171, 1.209.
- Recreation value of water in a mutually exclusive setting. 1.195.
- Rock Creek creel census—summer census. 2.42.
- State-wide lake and stream inventory of Minnesota. 1.85.
- State-wide lake and stream survey of Mississippi. 1.91.
- The reliability of partial creel checks as estimators of season totals. 4.14.
- Water quality, fish population and vegetation control of State Park lakes in Texas. 1.168.
- Water quality investigations to determine feasibility of recreational reservoir on Swatara Creek. 1.206.
- Water resources study of Brandywine Creek Basin in Pennsylvania. 1.15.

Reservoirs ....
- Access and reservoir site investigations. 1.108.
- Annual angler harvest from selected lakes. 1.130.
- Baseline studies on recreational area. Yellowtail Reservoir. 2.43.
- Construction and management of small ponds and impoundments for waterfowl on farmland. 1.141.
- Creel census, fishing pressure and management of Lake Seminole and Lake Blackshear in Georgia. 1.47.
- Dynamics of the fish population in Tenkiller Ferry Reservoir. 1.131.
- Economic potentials for water resources development in South Dakota. 3.36.
- Ecology of sport fish and sport fishery management in Illinois. 1.59.
- General survey of Kansas State waters for fishing. 1.61.

Hawaii State comprehensive outdoor recreation plan. 1.56.
Impact of the Pueblo Reservoir on migratory birds and hunting opportunities in the Arkansas Valley. 1.27.
Impact of water based recreation. 1.40.
Literature and data compilation for Maryland reservoirs. 1.66.
Multiple purpose water resource investigations. 1.41.
Owyhee district fisheries management investigations (Northeast Nevada). 1.109.
Possible effects of Alamo Dam construction on fish and wildlife resources in Arizona. 1.9.
Recreational values of water in the major reservoirs of New Mexico. 1.115, 2.56.
Water resources development studies—Costilla Project, Eastdale Reservoir. 1.24.
Water resources study of Brandywine Creek Basin in Pennsylvania. 1.15.
Wheeler district fisheries management investigations. 1.107.

Rivers .... A fishery survey of the Connecticut River. 1.35.
A National recreation area—the Connecticut River Study. 1.183.
An environmental approach for identifying outdoor recreation planning regions. 1.154.
Arizona outdoor recreation planning project. 1.11.
Biological survey of wild rivers. 1.101.
Creel census and angler counts on the Connecticut River. 1.69.
Development of water recreation in lakes and rivers of the Bristol Bay region of Alaska. 1.4.
Eutrophication in water resources of New York State. 1.39.
Evaluation of river fish populations. 1.94.
Evaluation of sport fishery for American shad in the Cape Fear River Basin. 1.120.
Hawaii State comprehensive outdoor recreation plan. 1.56.
Hydrologic parameters controlling recreational use of Minnesota rivers. 1.191.
Hydrology of river-based recreation. 1.190.
Inventory and evaluate wild or scenic river needs and possibilities. 1.179.
Inventory of waters for fishing in Eastern Montana. 1.99.
Liaison with mosquito control agencies. 1.44.
Missouri River national recreation area study. 1.182.
St. Johns River fishery project. 1.45.
Water inventory of upper Swan, Salmon River and high alkaline Eureka Lakes of Montana. 1.98.
Water storage project—central Arizona project. 1.6.
Wild river evaluation and classification. 1.102.

Salt Marshes .... Environmental changes, waterfowl usage, hunter pressure and feasibility of salt marsh impoundments. 1.121.
Waterfowl production, utilization, and harvest on salt marsh areas. 2.50.

CARRYING CAPACITY .... Concepts, definitions, and standards involved in the recreational carrying capacity of land. 4.5.
Recreation design criteria and demand. 4.23.
Recreational facilities inventory, demand and plan for Colorado. 1.83.

COMPETITIVE DEMAND .... Competitive recreational uses of selected Iowa lakes. 2.27.
Economic problems in the use, allocation, regulation, and pricing of water. 3.17.
Simulation as a means of studying resource allocations. 1.133.
Water and related land resources law and political institutions. 1.38.

DEVELOPMENT .... Cave climate of Carlsbad Caverns National Park in New Mexico. 1.192.
Economic and legal factors in providing, using and managing water resources in agriculture. 3.70.
Economic potentials for water resources development in South Dakota. 3.36.
Guides for forest land management under accelerated recreation demands and intensive land use. 3.4.
Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.2.
Regional comprehensive multipurpose water resources planning studies. 1.117.
Social and psychological factors associated with proposed changes in water use patterns. 2.90.

  Southern Illinois regional economic data system of water resources. 1.152.
  Water resources development studies—Costilla Project, Eastdale Reservoir. 1.24.
  Water resources development studies—Grand Mesa Project in Colorado. 1.28.

FOREST AREAS .... Determination of ecological factors important to management of mountain meadows. 1.193.

INVENTORY .... A survey and evaluation of small artificial recreational ponds in Central Massachusetts. 1.71.
  An inventory and study of beaver impounded water in Mississippi. 1.92.
  Biological survey of wild rivers. 1.101.
  Catalog of inland fishing waters. 1.122.
  Collection and application of information of use of forest recreation facilities. 1.151.
  Cooperative land and water resources inventory. 1.10.
  Economic potentials for water resources development in South Dakota. 3.36.
  General survey of Kansas State waters for fishing. 1.61.
  Inventory and biology of Yellowstone lake and stream fishes. 1.32.
  Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.2, 1.3.
  Inventory of waters for fishing in Eastern Montana. 1.99.
  Inventory of waters for fishing in Northern Montana. 1.96.
  Inventory of waters for fishing in Western Montana. 1.100.
  Irrigation & related water resources development of the South Dakota conservancy sub-district. 1.149.
  Outdoor recreation planning by a systems analysis approach. 4.7.
  Public access survey of public waters in Eastern Texas. 1.174.
  Public lake access and facilities survey. 1.171.
  Regional comprehensive multi-purpose water resources planning studies. 1.117.
  State-wide lake and stream inventory of Minnesota. 1.85.
  State-wide lake and stream survey of Mississippi. 1.91.
  Survey and evaluation of small artificial recreational ponds in Central Massachusetts. 1.70.
  Survey of Texas State park waters. 1.175.
  University outdoor recreation research study series—environmental recreation resources. 1.51.
  Water inventory of upper Swan, Salmon River and high alkaline Eureka Lakes of Montana. 1.98.
  Water quality, fish population and vegetation control of State Park lakes in Texas. 1.168.
  Wild river evaluation and classification. 1.102.
  Willamette Basin development study. 3.29.

PRIVATE ENTERPRISES .... Study of private outdoor recreation enterprises. 1.176.

RIVER BASINS .... A biological inventory of certain streams and impoundments in Alabama. 1.1.
  Irrigation & related water resources development of the South Dakota conservancy sub-district. 1.149.
  Regional comprehensive multi-purpose water resources planning studies. 1.117.
  The impact of water export on the area of origin. 1.18.

RURAL AREAS .... Appraisal of alternative means of economic development of specific local rural areas. 3.60.

WATERSHEDS .... A recreation study of the upper St. John River Watershed. 1.65.
  General survey of Kansas State waters for fishing. 1.61.
  Hydrology of river-based recreation. 1.190.
  Impact of land use on water quality within a forested mountain watershed. 1.30.
  Multiple purpose water resource investigations. 1.41.
  The economics and administration of water resources. 3.5.

WATER TRANSFER .... Recreational values of water in the major reservoirs of New Mexico. 2.56.
  The impact of water export on the area of origin. 1.18.

WEST VIRGINIA .... Consumer analysis for specific forest-oriented recreational activities in the Northeast. 2.96.
  Economic feasibility and impact of vertical or short take-off and landing aircraft for Appalachian region. 3.69.
  Forest fire prevention through public interest in game. 1.205.

  Summer camp for asthmatic children and fall, winter, spring camp for the chronically mentally ill. 2.94.
  Travel and tourism in West Virginia. 2.95.

WILDERNESS RECREATION .... Estimating recreational visits and use on unattended sites. 4.2.
  Recreational use of wilderness areas and requirements in relation to other forest uses. 1.136.
  Trends in urbanization, industrialization, and recreational use of arid lands. 1.12.
  Wildland recreational management. 3.30.

WILDLIFE MANAGEMENT
  FISH .... A survey of fishermen participation and preferences. 2.24.
    Analysis of the characteristics and distribution of the Ohio fisherman population. 2.66.
    Conservation officer creel census on lakes and streams. 2.51.
    Cost-harvest ratio from Southeastern New Mexico winter trout waters. 2.52.
    Ecology of sport fish and sport fishery management in Illinois. 1.59.
    Fishery dynamics, Florida Bay. 1.73.
    General survey of Kansas State waters for fishing. 1.61.
    Inventory and biology of Yellowstone lake and stream fishes. 1.32.
    Inventory and cataloging of the sport fish and sport fish waters in the interior of Alaska. 1.3.
    Owyhee district fisheries mangement investigations (Northeast Nevada). 1.109.
    Sport fishery catch statistics for scup. 2.59.
    Sport fishery catch statistics for tautog. 2.58.
    St. Johns River fishery project. 1.45.
    Survey and evaluation of small artificial recreational ponds in Central Massachusetts. 1.70.
    Water inventory of upper Swan, Salmon River and high alkaline Eureka Lakes of Montana. 1.98.
    Wheeler district fisheries management investigations. 1.107.
    1965 salt-water angling survey. 4.19.
    1967 fish harvest inventory. 2.89.
  GAME .... Determination of big game harvest. 1.208.
    Forest fire prevention through public interest in game. 1.205.
    Public hunting area utilization survey. 2.65.
    Surplus game availability in areas of Texas. 1.165.
    The socio-economics of recreational use of the Cache Elk Herd. 3.61.
  PHEASANTS .... Licensed pheasant club management program. 1.17.
    Utilization of wildlife management areas. 2.30.
  WATERFOWL .... Analysis of waterfowl kill card data. 1.194.
    Construction and management of small ponds and impoundments for waterfowl on farmland. 1.141.
    Liaison with mosquito control agencies. 1.44.
    Studies of teal populations in New Mexico. 2.53.
    Study of the feeding patterns of and hunting pressure on waterfowl attracted to a sanctuary. 1.87.
    Waterfowl production, utilization, and harvest on salt marsh areas. 2.50.

WILDLIFE RESOURCES
  ANTELOPE .... Antelope population trend estimates and harvest information. 1.110.
  CARIBOU .... Snow vehicle—caribou study—harvest. 2.3.
  DEER .... Surplus game availability in areas of Texas. 1.165, 1.166.
    Surplus game harvest, Black Gap wildlife management area. 1.169.
  DUCK .... An inventory and study of beaver impounded water in Mississippi. 1.92.
  FISH .... A National recreation area—the Connecticut River Study. 1.183.
    An inventory and study of beaver impounded water in Mississippi. 1.92.
    Creel census, benthos sampling and economic impact of Lake D'Arbonne in Louisiana. 1.63.
    Effects of fly-fishing only on a brook trout population. 2.99.
    Effects of restrictive size and bag limits on a wild brook trout population. 2.98.
    Evaluation of river fish populations. 1.94.
    Hunting and fishing pressure in Central Arizona. 1.8.
    Hydrology of river-based recreation. 1.190.

- Inventory of waters for fishing in Northern Montana. 1.96.
- Survey of Texas State park waters. 1.175.
- Water quality, fish population and vegetation control of State Park lakes in Texas. 1.168.

GAME BIRDS
- A study of hunting and duck populations on a selected area in West-central Minnesota. 1.86.
- Economic and social values in alternate use of rural lands in Pennsylvania. 2.74.
- Environmental changes, waterfowl usage, hunter pressure and feasibility of salt marsh impoundments. 1.121.
- Game bird hunter questionnaire. 2.101.
- Hunter survey and bag check. 2.45.
- Impact of the Costilla Project on migratory birds and hunting in the San Luis Valley. 1.25.
- Impact of the Pueblo Reservoir on migratory birds and hunting opportunities in the Arkansas Valley. 1.27.
- Impact of Upper South Platte project on migratory birds and hunting in South Platte Valley. 1.26.
- Selection of a method for estimating the demand for non-market water resources. 4.27.
- Surplus game availability in areas of Texas. 1.165, 1.166.
- Surplus game harvest, Black Gap wildlife management area. 1.169.
- Water resources development studies—Grand Mesa Project in Colorado. 1.28.
- Waterfowl harvest and hunting pressure. 2.2.

PHEASANTS
- Water resources development studies—Costilla Project, Eastdale Reservoir. 1.24.
- Water resources development studies—Grand Mesa Project in Colorado. 1.28.

QUAIL
- Weather and climate of scaled quail study areas. 1.112.

WING COLLECTION ENVELOPES
- Spy-blind study to learn accuracy of hunters' mail surveys. 4.9.
- Studies of teal populations in New Mexico. 2.53.

WISCONSIN
- Basic land economic data for selected areas of Northern Wisconsin. 3.71.
- Creel census on five lakes in Wisconsin. 2.97.
- Economic and legal factors in providing, using and managing water resources in agriculture. 3.70.
- Effects of fly-fishing only on a brook trout population. 2.99.
- Effects of restrictive size and bag limits on a wild brook trout population. 2.98.
- Organizational arrangements in the Milwaukee River, Southeastern Wisconsin to provide recreation. 1.78.
- Recreational facilities in Northern Wisconsin. 1.207.
- Social and ecological problems of northwoods wilderness-type recreation. 1.124.

WYOMING
- Demonstration camp for male adolescent diabetics. 3.72.
- Determination of big game harvest. 1.208.
- Game bird hunter questionnaire. 2.101.

YOUTH CAMPS
- Analysis of the operation and management of youth camps in Vermont. 3.64, 3.67.
- Summer camp for asthmatic children and fall, winter, spring camp for the chronically mentally ill. 2.94.

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